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Draft Environmental Impact Statement

Northern Rockies Lynx Amendment

National Forests in Montana, parts of Idaho, Wyoming and Utah
Bureau of Land Management units in Idaho and parts of Utah



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Northern Rockies Lynx Amendment
Draft Environmental Impact Statement

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Comments must be received by April 15, 2004

Abstract: The Forest Service and BLM are proposing to amend plans on 18 National Forest and four BLM administrative units to incorporate direction to manage lynx habitat. The DEIS was developed to meet the Purpose and Need of the amendment and to respond to primary issues. The Purpose and Need is to incorporate management direction that conserves and promotes the recovery of the Canada lynx, by reducing or eliminating adverse effects from land management activities on NFS and BLM lands, while preserving the overall multiple-use direction in existing plans. Lynx was listed as a threatened species in 2000 due the lack of guidance for conservation of lynx and snowshoe hare habitat in existing plans.

Public comments collected during scoping were used to identify primary issues, management concerns, alternatives and the scope of the DEIS. Five alternatives, including no action, were fully developed and considered. All action alternatives would incorporate varying degrees of management direction for vegetation, fire, grazing, recreation, minerals, roads and highways. An additional 21 alternatives were also considered but not fully developed. Alternative E is the preferred alternative.

Reviewer Comments: Reviewers should provide the Forest Service and BLM with their comments during the review period so the agencies can analyze and respond to all the comments at the same time, use information received to prepare the final EIS, and avoid undue delay in making the decision. Reviewers are asked to structure comments clearly to help the agencies understand their positions and recommendations *(Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978))*. Environmental objections that could have been raised at the draft stage may be waived if they are not raised until the final statement is completed *(City of Angoon v. Hodel (9th Circuit, 1986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980))*. The most helpful comments are specific and address the adequacy of the statement and the merits of the alternatives (40 CFR 1503.3).

Summary

Purpose and need

The Purpose and Need for the proposed amendment is to incorporate management direction that conserves and promotes recovery of the Canada lynx, by reducing or eliminating adverse effects from land management activities on national forest system and BLM lands, while preserving the overall multiple-use direction in existing plans.

Proposed action

In order to provide conservation and recovery of the Canada lynx the FS (Forest Service) and BLM (Bureau of Land Management) propose to amend land and resource management plans for 18 national forests (NF) in Idaho, Montana, Utah, and Wyoming, and land use plans for four BLM administrative units in Idaho and Utah (see Table 1-1 and Figure 1-1). The direction would apply to mapped lynx habitat estimated at 18.5 million acres or 48 percent of national forest lands and 1 percent of BLM lands. Limited direction would also apply to areas linking lynx habitat. The specific proposed management direction is described in Alternative B found in Chapter 2 of this document (see Table 2-1).

The FS is the lead agency responsible for preparing this amendment; Idaho and Utah BLM are cooperating agencies.

Background

The FWS (U.S. Fish and Wildlife Service) listed the Canada lynx as a threatened species in March 2000, saying the main threat was the lack of guidance to conserve lynx in 10- to 15-year-old forest and BLM plans. The FS and BLM signed conservation agreements with the FWS to consider the Lynx Conservation Assessment and Strategy during project analysis, and the FS agreed to not proceed with project determinations of "likely to adversely affect" lynx. This amendment would replace these agreements. Amended plans would more clearly meet Endangered Species Act obligations to conserve listed species and the National Forest Management Act requirement to manage habitat to maintain viable populations of lynx.

The proposed management direction primarily relies on the science and recommendations in two publications:

- *Ecology and Conservation of Lynx in the United States* (2000) summarizes current knowledge; and
- *Lynx Conservation Assessment and Strategy* (LCAS) (2000) recommends conservation measures for activities that could place lynx at risk by altering their habitat or reducing their prey.

Public involvement

The public has been involved in this amendment from the time when the FS and BLM first began trying to determine the scope of public interest in the project, on September 11, 2001, when a notice was published in the *Federal Register*, Volume 66, Number 176, 47160-47163.

On August 15, 2002, a Notice of Intent to prepare an Environmental Impact Statement was published in the *Federal Register*, Vol. 67, No. 158, pp. 53334-53335. The agencies are preparing an EIS because of the level of interest expressed during scoping. DEIS Chapter 2 summarizes public involvement efforts.

Issues

The scoping process was used to identify conflicts associated with the Proposed Action and to identify issues to use as a basis for developing alternatives. Comments that addressed the effects of the Proposed Action were sorted into *primary issues*, discussed below.

Five primary issues were identified. They reflect conflicts between lynx conservation and alternative uses of natural resources.

1. Over-the-snow trails

Issue: What are the effects of limiting the growth of groomed or designated over-the-snow routes, on opportunities for over-the-snow recreation?

2. Wildland fire risk

Issue: What are the effects of the lynx amendment on the risks of wildland fire to communities?

3. Winter snow shoe hare habitat in multistoried forests

Issue: What is the effect on lynx of allowing projects in winter snowshoe hare habitat in multistoried forests?

4. Precommercial thinning

Issue: What are the effects of limiting precommercial thinning, on restoring tree species that are declining and on stand structures that are declining?

5. FWS Remand decision

Issue: What level of management direction should be applied to activities that the FWS remand notice found were not a threat to lynx populations?

The primary issues were used to develop alternatives to the Proposed Action that meet the Purpose and Need. Several *management concerns* were also identified as a basis for formulating alternatives.

Additional management concerns addressed in alternatives

- Internal agency comments, as well as some public comments, expressed other concerns about the Proposed Action, largely involving procedural or administrative considerations rather than environmental consequences. Some people thought the Proposed Action would increase the complexity, cost or rigidity of

management without comparable benefits for lynx. These concerns have been addressed by developing different language in alternatives – see Chapter 2 for details.

Alternatives considered in detail

The range of alternatives was determined by evaluating the comments and the Purpose and Need; and considering the level of scientific information available to warrant a different approach, the FWS Listing Decision and ESA requirements.

Within these parameters, the alternatives developed display a reasonable range to guide future projects, respond to the issues and meet the Purpose and Need. Five alternatives were developed in detail. Chapter 2, Table 2-1 shows the differences in management direction between the action alternatives, B, C, D and E.

- Alternative A is the no-action alternative. In this case, no action means no change, no amendment to existing plans to address new information about lynx.
- Alternative B, the Proposed Action, was developed from conservation measures recommended in the LCAS. Alternative B addresses activities on NF and BLM lands that can affect lynx and their habitat.
- Alternative C was designed to respond to issues of over-the-snow recreation management and foraging habitat in multistoried forests, while providing a comparable level of protection to lynx as Alternative B, the Proposed Action.
- Alternative D was designed to address the issues of managing over-the-snow recreation and multistoried forests, similar to Alternative C. Alternative D also allows some precommercial thinning in winter snowshoe hare habitat, but still contributes to lynx conservation.
- Alternative E addresses the issue of wildland fire risk while contributing to lynx conservation. It also responds to statements made in FWS's Remand Notice that grazing, minerals, forest roads and over-the-snow activities do not affect lynx populations.

Alternative E has been identified as the preferred alternative.

Management direction considered, but not in detail

Some public comments gave suggestions for management direction that would have created other alternatives. A number of such alternatives to management direction were considered but dismissed from detailed consideration, for reasons summarized and discussed in the DEIS Chapter 2.

The rationale for not analyzing these alternatives in detail is based primarily on the narrowly defined Purpose and Need for the Proposed Action.

Suggested alternatives were compared to the Proposed Action and the other fully developed alternatives, to see whether they represented a distinctly different approach but still met the Purpose and Need.

Nature of effects

The amendment is programmatic in nature, consisting of direction that would be applied to future management activities. It does not prescribe site-specific activities on the ground, or irreversibly commit resources. CEQ regulations define *direct effects* as those occurring at the same time and place as the amendment. There are no direct environmental consequences of the amendment; therefore the analysis in the DEIS discusses only *indirect* and *cumulative* effects of the alternatives.

Direct effects would result from site-specific projects, and will be evaluated when those decisions are made.

In analyzing effects, it's assumed the standards would be met because complying with standards is mandatory. The analysis of effects is based primarily on projections of how future activities and areas would change because of the proposed standards. Such projections are inherently uncertain.

It's also assumed that the objectives generally would be achieved and the guidelines generally followed, though that may not always be true.

The baseline for effects disclosed in this chapter is the existing plans. The effects of existing plans have been previously determined and disclosed. The DEIS Chapter 3 describes changes in effects resulting from incorporating lynx conservation measures. Chapter 2, Table 2-2 summarizes the effects.

Generally, effects are presented as changes from existing plans, represented by Alternative A. Some effects on lynx are presented by comparing them to Alternative B, the Proposed Action, which was designed to conserve lynx. Cumulative effects include the effects of the existing plans as disclosed in accompanying NEPA documents and incorporated by reference.

Significance of effects

NEPA requires an EIS to be prepared for proposals that significantly affect the quality of the human environment. A DEIS was prepared based on the level of public interest for this amendment.

The overall effect of the action alternatives is to reduce the likelihood of environmental effects from future projects. The analysis in the DEIS has not identified any environmental effects likely to be significant. The DEIS discloses indirect effects of not taking future actions.

Decision framework

The DEIS has been prepared to evaluate the effects of the Proposed Action, and to look at alternative ways of achieving the Purpose and Need, while responding to the primary issues and management concerns.

The responsible officials will decide whether or not to amend FS and BLM plans to incorporate direction for lynx conservation and recovery, and if so what that direction would contain.

Due to agency-specific planning regulations, the BLM and FS will publish separate decision documents for their respective amendments.

Responsible officials

Kathleen McAllister, Deputy Regional Forester for the Northern Region, has been directing the preparation of the DEIS. The responsible officials are:

- Brad Powell, Regional Forester, Northern Region, Region 1, PO Box 7669, Missoula, Montana 59807;
- Rick Cables, Regional Forester, Rocky Mountain Region, Region 2, PO Box 25127, Lakewood CO, 80225;
- Jack Troyer, Regional Forester, Intermountain Region, Region 4, Federal Building, 324 25th Street, Ogden, UT 84401;
- K. Lynn Bennett, State Director for Idaho BLM, 1387 South Vinnell Way, Boise, ID 83709; and
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Chapter 1 Purpose and need

Purpose and need

The Purpose and Need for the proposed amendment is to incorporate management direction that conserves and promotes recovery of the Canada lynx, by reducing or eliminating adverse effects from land management activities on national forest system and BLM lands, while preserving the overall multiple-use direction in existing plans.

Background

Canada lynx occupy habitat in Colorado, Idaho, Maine, Michigan, Minnesota, Montana, New Hampshire, New York, Oregon, Utah, Vermont, Washington, Wisconsin and Wyoming – see Figure 1-2. In the western United States, lynx habitat is found primarily on federal lands.

Lynx inhabit moist coniferous forests that experience cold, snowy winters and provide a prey base of snowshoe hare. Lynx habitat is primarily found on moist sites that support subalpine fir, Engelmann spruce and lodgepole pine forests. In extreme northern Idaho and northwestern Montana, cedar-hemlock forests also are considered lynx habitat.

Lynx habitat is generally found at mid to upper elevations. The lower elevation ranges from 3,500 feet in the northern to 7,000 feet in the southern portions of the Northern Rockies lynx amendment area – see Figure 1-1, the amendment area map.

On July 8, 1998, the FWS (USDI Fish & Wildlife Service) proposed to list the Canada lynx as a threatened species under ESA (Endangered Species Act). The FS (USDA Forest Service) and BLM (USDI Bureau of Land Management) responded to the declining status of lynx in 1998 by establishing a team of international experts in lynx ecology to collect and summarize scientific data. This resulted in the publication *Ecology and Conservation of Lynx in the United States* (Ruggiero et al. 2000a).

Based on this information, an interagency team of government biologists developed the LCAS, *Lynx Conservation Assessment*

and Strategy (Ruediger et al. 2000). The LCAS recommended conservation measures for federal lands in the contiguous United States. The conservation measures focus on managing vegetation within the historic range of variability, maintaining dense understory conditions for prey, minimizing snow compaction, and identifying and maintaining connectivity within and between habitat areas.

In December 1999, the FS and BLM prepared a BA, a *Biological Assessment* (Hickenbottom et al. 1999) of 57 NF (national forest) land and resource management plans and 56 BLM land use plans, the units with lynx habitat. The assessment found the existing plans were likely to adversely affect lynx because they did not contain direction to conserve lynx.

In February 2000, five FS Regional Foresters and four FWS Regional Directors signed a *Lynx Conservation Agreement* (USDA FS, USDI FWS 2000b) to promote the conservation of lynx and its habitat. In August 2000, the BLM Assistant Director for Renewable Resources and Planning and two FWS Regional Directors signed a similar agreement (USDI BLM, USDI FWS 2000).

Both conservation agreements require the agencies to review and consider the recommendations in the LCAS before making any decisions about projects in lynx habitat. The FS also agreed not to authorize projects (except for 3rd party projects) likely to adversely affect lynx until a decision is made about changing existing plans. The agreements say any changes in long-term management direction will be made by amending or revising the existing plans.

In April of 2000, the FWS listed lynx as a threatened species (USDI FWS 2000b). In its Listing Decision, the FWS said,

The FWS listed lynx as threatened, effective April 24, 2000. The FWS had concluded that the chief threat to lynx in the contiguous United States was the lack of guidance in federal plans.

> *" We conclude that the single factor threatening the contiguous United States distinct population segment of lynx is the lack of guidance for conservation of lynx and snowshoe hare habitat in National Forest Land and Resource Plans and BLM Land Use Plans."*

Formal consultation on existing plans required by ESA was completed on October 25, 2000, when the FWS issued its BO, *Biological Opinion* (USDI FWS 2000a). In the BO, the FWS said existing plans as applied together with the conservation agreements, were not likely to jeopardize the continued existence of lynx.

In March 2001, the FS and BLM developed schedules to amend or revise their existing plans – see Appendix D.

In September 2001, the FS and BLM initiated the Northern Rockies Lynx Amendment, a proposal to amend existing plans for 22 units in the northern Rockies – see Figure 1-1.

In July 2003, the FWS issued a Notice of Remanded Determination of Status for the contiguous United States population of lynx (USDI FWS, 2003). In it, the FWS reaffirmed its decision to list the lynx as threatened, rather than endangered.

Many of the risk factors to lynx had not been identified at the time the existing plans were developed – the purpose and need of this amendment is to conserve lynx by addressing these risk factors as they apply to FS and BLM lands, by adding to or changing management direction.

Need for management direction

The LCAS identified risks to lynx and lynx habitat. The BA found many of the risk factors were not addressed in existing plans. Reducing or eliminating these risks is part of the Purpose and Need.

Risk factors affecting lynx productivity (*productivity* means the ability to continue to reproduce) include

- Timber management
- Wildland fire management
- Livestock grazing
- Recreational uses
- Forest backcountry roads and trails
- Other human developments

Lynx require certain habitat elements to persist in a given area, including foraging and denning habitat. *Foraging habitat* supports lynx primary prey, snowshoe hare, year-round. *Winter snowshoe hare habitat* occurs where many young trees or shrubs grow tall enough to protrude above the snow. This can happen in young regenerating forests that grow up after a disturbance, or in older forests with a substantial understory of shrubs and young trees. *Denning habitat* is found in areas with large amounts of woody debris, either down logs or root wads.

Activities like timber harvest, fire suppression and livestock grazing, can affect the amount, distribution and condition of lynx denning and winter snowshoe hare habitat.

Other predators may affect lynx. Lynx have developed a competitive advantage in places where deep, soft snow tends to exclude other predators in mid-winter, the time when prey is most limiting.

Activities that result in providing access to other predators are also a potential risk. Such activities include winter recreation, the winter use of forest roads and trails and other human developments.

Risk factors affecting mortality include

- Trapping
- Shooting
- Predator control
- Highways
- Predation by other species

These factors can directly cause lynx deaths. Trapping is no longer allowed in the amendment area. Incidental or illegal shooting can occur, but is regulated by state agencies. Predator control activities are conducted by USDA Wildlife Services. These risk factors are not addressed in this DEIS (draft environmental impact statement) because decisions about them are outside the authority of the FS and BLM.

Highways are a known source of direct mortality.

Anything that increases the presence of predators also may contribute to indirect mortality.

Risk factors affecting movement

- Highways and associated development
- Private land development

Lynx are known to disperse over wide areas. Highways and the developments associated with them may impede lynx movement. The FS and BLM have only limited authority to address highways, and no authority to control what happens on private land.

The FWS decision to list lynx as threatened was based on a subset of these risks, which threaten the lynx population as a whole. Threats to lynx populations influenced by national forests and BLM land management include timber harvest regimes and fire suppression, as well as the lack of guidance to address these threats in existing plans. Lynx conservation and recovery requires that the plans address these threats.

Direction is needed to guide project-level decisions

- To avoid or reduce adverse effects from a spectrum of management activities; and
- To maintain or improve Canada lynx habitat.

To respond more quickly and consistently, management direction is considered for the planning area as a whole, rather than addressing each plan individually. The new management direction seeks to preserve the overall multiple-use direction in existing plans by avoiding making significant changes. Adjustments to individual plans may be considered as they are revised during the next several years.

Proposed action

In order to provide conservation and recovery of the Canada lynx the FS and the BLM propose to amend land and resource management plans for 18 NFs in Idaho, Montana, Utah, Washington and Wyoming, and land use plans for four BLM administrative units in Idaho and Utah. Collectively these will be referred to as *"existing plans."* The FS is the lead agency responsible for preparing this amendment; Idaho and Utah BLM are cooperating agencies.

The FWS's *Lynx Biological Opinion* concluded

> *...if Plans are amended or revised incorporating conservation measures in the LCAS or the equivalent thereof...the Plans would likely not jeopardize the continued existence of lynx.*

The original Proposed Action was based on conservation measures recommended in the LCAS as a way to achieve lynx conservation. Measures from the LCAS were reorganized and rearranged to make it easier to include them in the existing plans. Every effort was made to preserve the intent of the measures in the LCAS.

The original Proposed Action is now Alternative B and has changed somewhat from how it was described in the fall of 2001 when the agencies asked for public comments on the scope of the proposal. It was rewritten to provide clearer management direction by organizing it better and eliminating duplication. Appendix A is a crosswalk between the LCAS, the scoping version of the proposed action and the DEIS Proposed Action, Alternative B.

Throughout this document, references to the Proposed Action mean Alternative B, the DEIS Proposed Action.

The Proposed Action is an amendment that would add or modify management direction in existing plans and would consist of one or more of the following:

- *Goals*, which are general descriptions of desired results;
- *Objectives*, which are descriptions of desired resource conditions;
- *Standards*, which are management requirements designed to meet the objectives; and
- *Guidelines*, management actions normally taken to meet the objectives.

The existing plans contain general resource management direction. Plans do not compel management activities to occur. Whether goals and objectives are achieved depends on agency budgets and

Alternative B, the Proposed Action, has changed from how it was described during scoping. It was rewritten to provide clearer management direction by organizing it better and eliminating duplication.

competing priorities. Standards may prohibit some management activities from occurring; however, standards can be changed through subsequent plan amendment or revision. Guidelines are recommendations, and following them is discretionary; however, documentation of reasons for not following them may be required. (The term "guidelines" is not defined in the current planning regulations, and is not used in the 2002 proposed planning regulations.)

This amendment is limited in scope. It's not intended to and does not encompass all the issues or resource needs that may be considered when plans are revised. The amendment adds only those goals, objectives, standards and guidelines relating to specific lynx habitat risk factors. The amendment would not change the land-use allocations in existing plans.

The amendment applies only to lynx habitat in LAUs (lynx analysis unit – see the *Lynx* section in Chapter 3), or to lynx linkage areas identified based on local information at the time a project is proposed.

The amendment does not make a decision about what lynx habitat is or where linkage-area boundaries are, or how they are identified.

Lynx habitat and linkage areas used in this analysis are based on the best current inventory information currently available at this scale – see Figure 1-1 displaying lynx habitat and linkage areas. This information has been compiled under the guidance of the Interagency Lynx and Wolverine Steering Committee. See Appendix B for a description of how the maps used for analysis and the DEIS were prepared; see the *List of Preparers* for a description of the Committee and its role.

The Proposed Action considers information from the following sources:

- *Ecology and Conservation of Lynx in the United States* (Ruggiero et al. 2000a)
- LCAS, *Canada Lynx Conservation Assessment and Strategy* (Ruediger et al. 2000)
- FWS's *Final Listing Rule, Federal Register*, Vol. 65, No. 58, 16051-16086 (USDI FWS 2000b)
- FS and BLM's BA, *Biological Assessment of the Effects of National Forest Land and Resource Management Plans and Bureau of Land Management Land Use Plans on Canada Lynx* (Hickenbottom et al. 1999)
- FWS's BO, *Lynx Biological Opinion* (USDI FWS 2000a)

These documents present a summary of scientific knowledge on issues relevant to lynx conservation, and are available on-line at www.fs.fed.us/r1/planning/lynx.html.

Administrative units included in the amendment

The LCAS identifies five geographic areas that provide habitat for lynx in the United States – see Figure 1-2 on the following page. Each geographic area has unique ecosystems and management histories. This amendment will apply to lands located within the Northern Rocky Mountains Geographic Area. This geographic area encompasses lands in Idaho, Montana, Oregon, Utah, Washington and Wyoming.

Eighteen national forests in FS regions 1, 2 and 4, and four BLM units in Idaho and Utah, are part of this amendment – see Table 1-1.

The federal lands affected by this amendment include lynx habitat and linkage areas inside these units, and are referred to as the amendment area. The number of plans affected by this amendment is different from the number of units affected, because some units have been consolidated. Units and plans affected by this amendment are:

Table 1-1. Administrative units and plans that would be amended

Forest Service		
Idaho national forest units	FS region	Land and resource management plan
Clearwater	1	Clearwater forest plan
Idaho Panhandle	1	Idaho Panhandle forest plan
Nez Perce	1	Nez Perce forest plan
Salmon-Challis	4	Salmon forest plan
	4	Challis forest plan
Caribou-Targhee	4	Targhee forest plan
Montana national forest units	FS region	
Beaverhead-Deerlodge	1	Beaverhead forest plan
	1	Deerlodge forest plan
Bitterroot	1	Bitterroot forest plan
Custer	1	Custer forest plan
Flathead	1	Flathead forest plan
Gallatin	1	Gallatin forest plan
Helena	1	Helena forest plan
Kootenai	1	Kootenai forest plan
Lewis and Clark	1	Lewis and Clark forest plan
Lolo	1	Lolo forest plan
Utah national forest units	FS region	
Ashley	4	Ashley forest plan
Wyoming national forest units	FS region	
Bighorn	2	Bighorn forest plan
Bridger-Teton	4	Bridger-Teton forest plan
Shoshone	2	Shoshone forest plan

Bureau of Land Management		
Idaho districts	**BLM field office**	**Land use plan**
Lower Snake River	Four River	Cascade resource management plan
Upper Columbia/ Salmon/Clearwater	Salmon	Lemhi resource management plan
	Challis	Challis resource management plan
	Coeur d'Alene	Emerald Empire management framework plan
	Cottonwood	Chief Joseph management framework plan
Upper Snake River	Idaho Falls	Medicine Lodge MFP
	Pocatello †	Pocatello resource management plan †
	Shoshone	Sun Valley management framework plan
Utah field office		
Salt Lake City	†	Randolph management framework plan †

†These units have no lynx habitat, so only the linkage direction in the proposed amendment applies

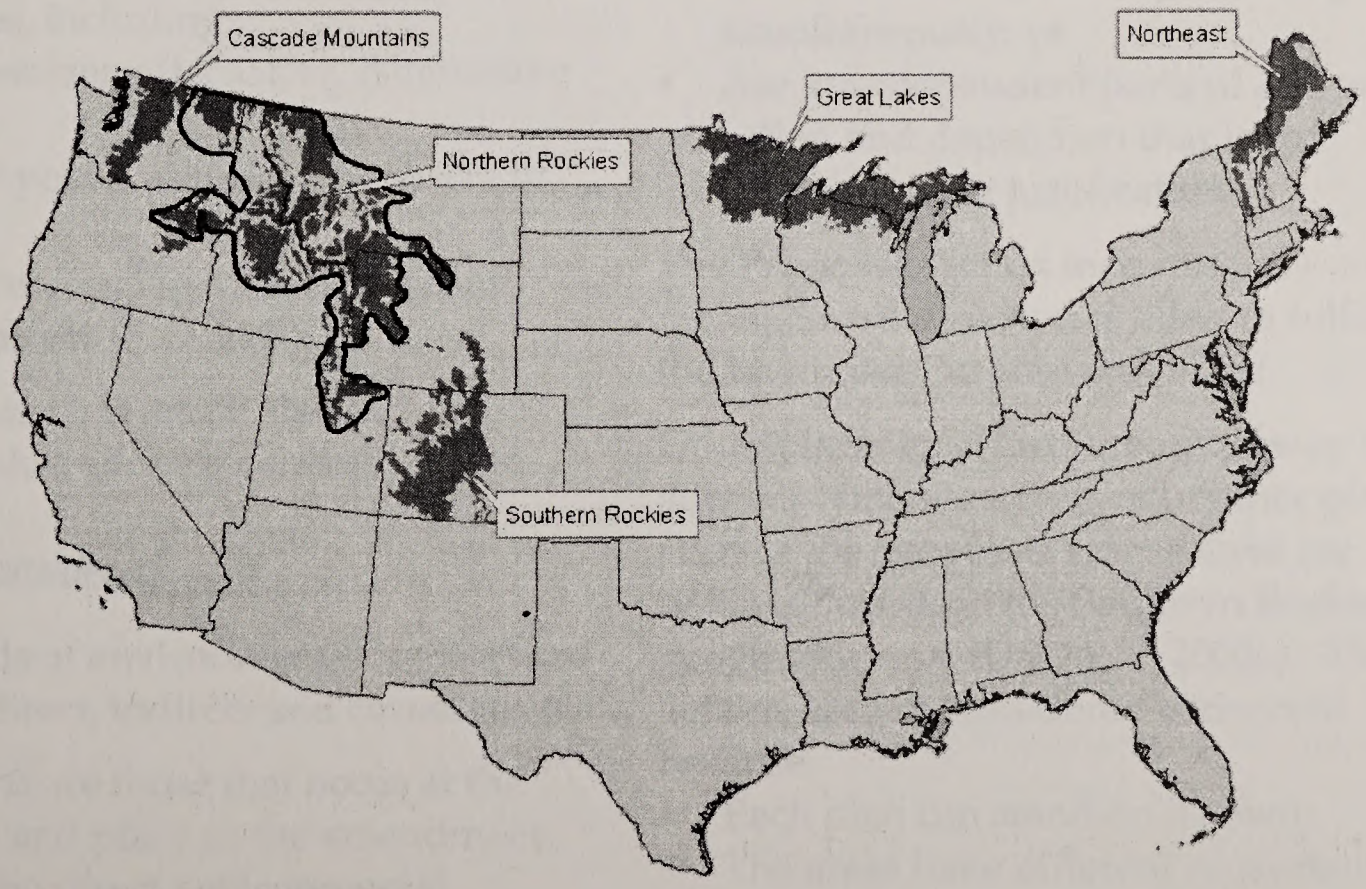


Figure 1-2. US lynx geographic areas

Not all the FS and BLM units inside the Northern Rockies geographic area are included in this amendment. Existing plans for eleven national forests in the geographic area will not be changed by this amendment. These include:

- In Region 4, the Payette, Boise, Sawtooth, Caribou, Wasatch-Cache and Unita NFs, which have nearly completed revising their plans. Information from this amendment has been used in developing those plans.
- In Region 6, the Colville, Umatilla, Wallowa-Whitman, Malheur and Ochoco NFs, which will address lynx through later planning efforts.

The BLM units included in this amendment are limited to those in Idaho and northwest Utah. BLM units in Montana and Wyoming, and the remainder of Utah, will address lynx as needed in separate processes and are not part of this proposal.

The revision schedule in Appendix D shows the tentative timetable for other planning efforts. Once this amendment is in place, individual plans may be amended or revised as needed to respond to new information, local conditions or to comply with revision schedules.

- Nineteen of the 20 forest plans that would be amended by this decision will probably be revised within the next few years – the Targhee NF revised its plan in 1999.
- The BLM has recently started revising and replacing existing plans, and anticipates that all out-of-date plans will be replaced within the next few years.

Scope

"*Scope*" is defined in 40 CFR 1508.25 as the range of actions, alternatives and impacts to be considered in an environmental analysis. The Proposed Action and its alternatives consist of goals, objectives, standards and guidelines. The DEIS addresses their effects.

To determine the scope of an environmental impact statement, agencies consider three kinds of alternatives, three kinds of impacts and three kinds of actions, namely, connected, cumulative and similar actions.

Alternatives considered

The analysis evaluates three types of alternatives, including

- The no-action alternative, Alternative A;
- The Proposed Action, Alternative B; and
- Other reasonable courses of action, Alternatives C, D and E.

Alternatives C, D and E also include measures that address primary issues.

Impacts considered

Three kinds of environmental impacts are possible, direct, indirect and cumulative.

Direct effects are those that occur at the same time and place as the amendment. There are no direct environmental consequences of the amendment. The amendment is programmatic in nature, consisting of direction that would be applied to future management activities. It does not prescribe site-specific activities on the ground. Direct effects would be disclosed later at the project level, when site-specific decisions were made.

This analysis evaluates the *indirect* and *cumulative effects* of the Proposed Action and alternatives.

Actions considered

Connected actions

Connected actions are closely related actions that:

- Automatically trigger other actions;
- Cannot or will not proceed unless other actions are taken previously or simultaneously; or
- Are interdependent parts of a larger action and depend on that larger action for their justification.

The Proposed Action includes the management direction needed to fulfill the identified Purpose and Need.

Other planning efforts are underway to address lynx management in other places, such as the proposed amendment for national forests in the Southern Rockies geographic area (USDA FS 2000a). These actions are not considered connected because:

- Each plan can stand on its own;
- The areas have different ecosystems and management histories; and
- The decisions can be made independently under NFMA.

Cumulative actions

Cumulative actions are those which, when viewed with past, other present and reasonably foreseeable actions, may have cumulatively significant impacts and should be discussed in the same environmental analysis.

Other programmatic actions on BLM, FS, other federal, tribal, state and private lands have been evaluated where information is available to determine the cumulative effects. This analysis is described in Chapter 3 and Appendix L.

Similar actions

Similar actions are those that have similar timing or are geographically close to the Proposed Action. These actions may be considered in the same environmental analysis as the Proposed Action and its alternatives.

The Southern Rockies Lynx Amendment effort is underway in Colorado. However, that effort is not included with this one because of differing ecosystems and management histories.

Legal background

The following laws and regulations apply to all the resources analyzed. Others apply only to a specific resource area, and are described in Chapter 3 in the section about that resource.

Multiple-Use Sustained-Yield Act
The Multiple-Use Sustained-Yield Act says the national forests are established and shall be administered for outdoor recreation, range, timber, watershed and wildlife and fish purposes.

NFMA
The National Forest Management Act and 36 CFR 219 provides direction to the FS about developing, maintaining and revising land and resource management plans. NFMA says plans must provide a sustained yield of goods and services and provide for multiple uses, in a way that will both maximize long-term net public benefits and be environmentally sound.

FLPMA
Federal Land Plan Management Act and 43 CFR 1601 and 1610 provide direction and establish a process for developing, approving, maintaining, amending and revising resource management plans, and using existing plans for public lands administered by the BLM. In FLPMA Congress declared the policy of the United States was to manage public land based on multiple use and sustained yield unless otherwise specified by law.

ESA
The Endangered Species Act and 50 CFR 402 apply to federal lands and direct federal agencies to use their authorities to carry out conservation programs for listed species. ESA directs federal agencies to make sure their actions are not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of critical habitat.

The Canada lynx is listed as a threatened species, and is the focus of this proposed management direction. No critical habitat has been identified for the Canada lynx to date.

Decision framework

The DEIS is being prepared to evaluate the effects of the Proposed Action, and to look at alternative ways of achieving the Purpose and Need, while responding to the *primary issues* described in Chapter 2.

The responsible officials will decide whether or not to amend FS and BLM plans to incorporate direction for lynx conservation and recovery, and if so what that direction would contain.

Due to agency-specific planning regulations, the BLM and FS will publish separate decision documents for their respective amendments.

Responsible officials

Kathleen McAllister, Deputy Regional Forester for the Northern Region, has been directing the preparation of the DEIS. The responsible officials are:

- Brad Powell, Regional Forester, Northern Region, Region 1, PO Box 7669, Missoula, Montana 59807;
- Rick Cables, Regional Forester, Rocky Mountain Region, Region 2, PO Box 25127, Lakewood CO, 80225;
- Jack Troyer, Regional Forester, Intermountain Region, Region 4, Federal Building, 324 25th Street, Ogden, UT 84401;
- K. Lynn Bennett, State Director for Idaho BLM, 1387 South Vinnell Way, Boise, ID 83709; and
- Sally Wisely; State Director for Utah BLM, 324 South State Street, Salt Lake City, UT 84145.

How information is presented

Chapter 1

Chapter 1 explains and describes the *Purpose and Need* for the proposed amendment and the scope of the decision.

Chapter 2

Chapter 2 presents *primary issues* and *management concerns* identified during scoping. Then it describes alternatives to the Proposed Action that respond to the primary issues and management concerns.

Chapter 2 also describes alternatives not considered in detail, and other concerns that did not lead to alternatives.

Chapter 3

Chapter 3 presents the *affected environment* and the *environmental effects* of the alternatives.

Chapter 4

Chapter 4 includes a list of who prepared this document and a list of agencies and groups contacted.

Supporting information

Supporting information, including a glossary of terms and a bibliography of references, follow Chapter 4.

Appendixes

The appendices contain more detailed information used in the effects analysis and are frequently referenced in the text.

The project record

The Project Record is referenced throughout this document. It includes the information used for analysis, made available to the responsible officials. Information will continue to be added to the Project Record as the NEPA process continues.

On request, information from this file can be provided or made available for review – contact the Northern Rockies Lynx Amendment, Regional Forester's Office, P.O. Box 7669, Missoula, Montana 59807. Much information is available on-line at www.fs.fed.us/r1/planning/lynx.html.

Chapter 2 Alternatives

Introduction

NEPA regulations at 40 CFR 1502.14 say that Chapter 2 is the heart of the environmental impact statement, describing the alternatives. Based on the information and analysis presented in Chapter 3, the regulations say Chapter 2 should compare the environmental impacts of the proposal and the alternatives, sharply defining the issues and providing a clear basis for choice among options.

Chapter 2 describes Alternative B, the Proposed Action, developed in response to the Purpose and Need identified in Chapter 1. It also describes alternatives to the Proposed Action, including a no-action alternative, which is defined as no change from existing plans.

The alternatives were developed by changing some of the standards and guidelines to respond to comments raised during scoping. These changes were used to create three alternatives, C, D and E. No changes were made to the goal or the objectives. The DEIS evaluates the effects of the standards and guidelines, both individually and collectively.

People who review this DEIS may suggest different objectives, standards or guidelines. The objectives, standards and guidelines could be regrouped in other ways to create other alternatives. The FS and BLM will consider comments on the alternatives and individual measures before any decisions are made.

The responsible officials may approve one alternative or a combination of measures from different alternatives. Then, the goal, objectives, and selected standards and guidelines, would be applied to future projects by adding them as management direction to existing plans.

If decisions were made to amend the existing plans by adopting these lynx conservation measures, they would not be irreversible decisions. Such decisions could be amended again or revised, subject to ESA consultation.

Public participation

The public has been involved in this amendment from the time the FS and BLM first began trying to determine the scope of public interest in the project, on September 11, 2001, when a notice was published in the *Federal Register*, Vol. 66, No. 176, 47160-47163. The notice announced the agencies were accepting comments on the lynx proposal.

Originally, the comment period was scheduled to end on October 26, 2001, but it was extended to December 10, 2001. The FS and BLM gave people more time to comment, both in response to several requests and because of the general disruption stemming from the September 11th terrorist attacks.

An official website was created at www.fs.fed.us/r1/planning/lynx.html, providing information about the amendment, including the information used to develop the Proposed Action.

Open-house meetings were held to provide a better understanding of the lynx proposal and to gain an understanding of public issues and concerns. Most newspapers in the amendment area ran stories about the proposed amendment and open-house meetings. Open houses were held in:

- Idaho at Bonners Ferry, Challis, Coeur d'Alene, Coolin, Grangeville, Idaho Falls, Orofino and Salmon;
- Montana at Billings, Bozeman, Dillon, Great Falls, Hamilton, Helena, Kalispell, Libby and Missoula; and
- Wyoming at Cody, Jackson Hole, Riverton and Sheridan.

FS and BLM units mailed out more than 6,000 letters about the proposed amendment and upcoming meetings to their mailing lists of people interested in land management issues. Comments were solicited from individuals and organizations, and from federal, state and local government agencies interested in or affected by the Proposed Action, as well as from FS and BLM employees – see the *Scoping* section in the Project Record.

Tribes with aboriginal territories located inside the amendment area were identified and individual letters written to each of them. The letters asked for their participation and identified local federal contacts.

The governor's office for each state was also contacted about their briefing needs. Discussions were held with the State of Idaho Office of Species Conservation and the Montana Departments of Natural Resources & Conservation and Fish, Wildlife & Parks. The State of Utah considered cooperating agency status, but decided they would participate on the Lynx and Wolverine Steering Committee instead of this effort.

The 1,890 public responses to the scoping notice that were received by December 17, 2001, were evaluated and summarized in a report called *Summary of Public Comments* – see the *Scoping* section of the Project Record. Responses received after

December 17, 2001, but before the release of this DEIS were also considered. A summary of these comments is also in the *Scoping* section of the Project Record.

The summary analyzes the public's responses, describing what people said as completely and directly as possible. The system used to analyze public responses was designed to be objective, reliable and easily tracked. Many responses were signed by more than one person, for a total of responses from 2,743 people – individuals, businesses, organizations and agencies. People provided written comments in letters and e-mail messages, on comment forms and faxes, and at meetings. More than half the people who responded submitted form letters. One petition was received.

In mid-May 2002, an eight-page update was mailed to the more than 2,000 addresses of the people who responded to the scoping notice.

On August 15, 2002, a Notice of Intent to prepare an Environmental Impact Statement was published in the *Federal Register*, Vol. 67, No. 158, pp. 53334-53335. The agencies are preparing an EIS because of the level of interest expressed during scoping.

There were five responses to the Notice of Intent, which also have been considered.

The *Scoping* section of the Project Record includes a communication plan – written to make sure no one was overlooked – as well as copies of the public involvement documents.

Issues & concerns addressed in alternatives

NEPA regulations at 40 CFR 1501.2(c) say that federal agencies shall

> *... study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflict concerning alternative uses of available resources.*

Accordingly, the scoping process was used to identify conflicts associated with the Proposed Action and to identify issues to use as a basis for developing alternatives. Comments that addressed the effects of the Proposed Action were sorted into *primary issues*, discussed below.

Five primary issues were identified. They reflect conflicts between lynx conservation and alternative uses of natural resources. The primary issues were used to develop alternatives to the Proposed Action that meet the Purpose and Need.

Several *management concerns* were also used as a basis for formulating alternatives. Both the primary issues and the management concerns are addressed in the *Issues* section later in Chapter 2.

Alternatives were not developed in detail about some suggestions for management direction or other ideas that were more general in nature. These were categorized as *Management considerations dismissed* or *Other concerns*, and can be found later in Chapter 2. Responses to all comments can be found in the *Issues* section of the Project Record.

While many commenters opposed adding management direction to conserve lynx to the existing plans, an alternative was <u>not</u> developed to reflect that point of view because it's already reflected in the no-action alternative, Alternative A. Further, the responsible officials could decide to <u>not</u> adopt some of the direction proposed in the action alternatives, Alternatives B, C, D and E.

The following describes the primary issues and indicators that can be used to compare how the action alternatives respond to them. More information can be found in the *Issues* section of the Project Record.

Primary issues

1. Over-the-snow recreation

Issue: What are the effects of limiting the growth of designated over-the-snow routes, on opportunities for over-the-snow recreation?

Lynx have evolved a competitive advantage in places with deep, soft snow, where other predators tend to be excluded during mid-winter when prey is most scarce (Ruediger et al. 2000, p.1-2). Snow shoeing, cross-country skiing and snowmobiling compact snow and may make it possible for competing predators to occupy lynx habitat during winter (Ruediger et al. 2000, p.2-8).

Standard HU S1 says there can be no net-increase in designated over-the-snow routes in an LAU, unless the increase consolidates use and improves lynx

habitat. The term *"designated routes"* has a specific meaning and does not refer to all snowmobile routes – see the *Glossary*.

Some people said the standard unfairly restricted special-use permits and agreements, because the public could continue to expand their use into areas that are not designated, but people operating under permits or agreements could not expand their use into the same areas.

Issue indicators

- Ability to expand groomed routes
- Ability to expand designated routes
- Effect on over-the-snow winter recreation opportunities

2. Wildland fire risk

Issue: What are the effects of lynx amendment standards on the risks of wildland fire to communities?

Historically, natural disturbance processes like fire created and maintained a mosaic of forest stages that provided habitat for both snowshoe hare and lynx (Ruediger et al. 2000, p.2-5).

In August 2000, the President directed the Secretaries of Agriculture and the Interior to develop a response to severe wildland fires, to reduce fire impacts on rural communities and to ensure effective firefighting capacity. The result was the National Fire Plan. Congress later directed a 10-Year Comprehensive Strategy be developed to reduce wildland fire risk by improving fire prevention and suppression, reducing hazardous fuels, restoring fire-adapted ecosystems and promoting community assistance (USDA FS 2001).

Objective VEG O3 says fire should be used to restore ecological processes and maintain or improve lynx habitat. However, Standards VEG S1 through VEG S6 could limit fuel treatments.

Some people thought the amendment might preclude fuel treatment, especially in the WUI (wildland urban interface).

Issue indicators

- Limits imposed on fuel treatments that reduce winter snowshoe hare habitat
- Ability to conduct fuel treatment outside winter snowshoe hare habitat
- Percent of fuel treatment program both inside and outside the WUI that may need to be relocated during the next decade due to Standards VEG S5 and VEG S6
- Effect on wildland fire risk

3. Winter snowshoe hare habitat in multistoried forests

Issue: What is the effect on lynx of allowing projects in winter snowshoe hare habitat in multistoried forests?

Winter snowshoe hare habitat can be found in older forests with substantial undergrowth of shrubs and tree branches that snowshoe hares can reach during winter.

The LCAS, considered the best scientific information available at the time it was written, recognized that older forests with substantial undergrowth were important to lynx, but recommended restricting only precommercial thinning.

The Proposed Action was based on the LCAS. Like the LCAS, it contains measures to protect winter snowshoe hare

habitat, including measures restricting precommercial thinning.

Other activities, such as prescribed burning, fuel treatment and timber harvest, can reduce foraging habitat in older, multistoried forests. These same activities also can create multistoried conditions or can be used to prolong winter snowshoe hare habitat.

Some people said the amendment should preclude all activities that reduce winter snowshoe hare habitat. While many other comments suggested protections for lynx beyond what the LCAS recommended, this was the only one with a scientific basis for questioning the adequacy of the LCAS recommendations.

Issue indicators

- Activities allowed in multistoried forests that provide winter snowshoe hare habitat outside wilderness
- Effect on winter snowshoe hare habitat in multistoried forests outside wilderness

4. Precommercial thinning

Issue: What are the effects of limiting precommercial thinning, on restoring tree species and forest structures that are declining?

Dense sapling cover is a major component of winter snowshoe hare habitat – winter hare habitat is important to lynx because the hare is its primary prey (Ruediger et al. 2000, p.1-7). Winter habitat is the most limiting (Ruggerio et al. 2000a). Dense saplings are found:

- In the young regenerating forests that grow up after a major disturbance like regeneration timber harvest or stand-replacing fire; and
- In older forests with substantial undergrowth of shrubs and short trees that snowshoe hares can reach during winter.

In the northern Rockies, western white pine, whitebark pine, ponderosa pine, quaking aspen and western larch are all declining (USDA FS 1998).

These species all require some level of disturbance – historically, fire – to grow into mature trees, or else they get over-topped and out-competed by faster-growing species that are more apt to be killed by fire. See the *Forests* section in Chapter 3 for descriptions of species status.

Lodgepole pine often regenerates densely. In the past, low-intensity fires thinned them out, encouraging some to develop into large, mature trees (Lotan et al. 1985). Forests of large lodgepole pine trees are used by many wildlife species, including goshawk (Shaw 2002).

Standards VEG S5 and VEG S6 defer precommercial thinning in winter snowshoe hare habitat. Thinning would be allowed within 200 feet of administrative sites, dwellings or outbuildings.

Some people said precommercial thinning should continue to be used to restore tree species that are declining or to encourage future large trees.

Issue indicators

- Ability to precommercially thin young regenerating forests to maintain or restore tree species in decline
- How much precommercial thinning could be done overall

- Precommercial thinning deferred by the lynx amendment during the next decade, based on historic average funding of about 34 percent of what's requested
- Effect on tree species in decline

5. FWS Remand decision

Issue: What level of management direction should be applied to activities that the FWS remand notice found were not a threat to lynx populations?

On July 3, 2003, the FWS issued a Notice of Remanded Determination of Status for the contiguous United States distinct population segment of the Canada lynx (USDI FWS, 2003). The notice revisited the five factors used to determine whether lynx should be listed as threatened or endangered, and reassessed the magnitude of threats to lynx. The notice said lynx is not endangered throughout a significant portion of its range, reaffirming the decision to list lynx as threatened.

The notice said that, for several risk factors identified in the LCAS, no evidence exists that they pose threats to lynx populations: "The risks identified in the LCAS are based on effects on either individual lynx, populations, both, or lynx habitat. Therefore, not all of the risks identified in the LCAS threaten lynx populations in the United States" (p. 40096). The notice specifically discussed several of the risk factors addressed in the Proposed Action.

- "Mining and grazing were not specifically addressed because we have no information to indicate they pose threats to lynx." (p. 40083)
- "... lynx show no evidence of being displaced by or avoidance of unpaved forest roads. We find no information demonstrating that forest roads negatively impact lynx (Roe et al. 2001) and, therefore do not consider forest roads to be a threat to lynx." (p. 40097)
- "There continues to be no data on the role of competition between lynx and other species ... At this time there is no evidence that, if competition exists between lynx and any of these species, it exerts a population-level impact on lynx; therefore we do not consider competition to be a threat to lynx." (p. 40097)
- "... Because no evidence has been provided that packed snowtrails facilitate competition to a level that negatively affects lynx, we do not consider packed snowtrails to be a threat to lynx at this time." (p. 40098)

The notice raises questions about whether the amendment should apply only to activities that threaten lynx populations.

Issue indicators

- Nature of management direction applied to grazing, minerals, roads and over-the-snow recreation.

Additional management concerns addressed through alternatives

Internal agency comments, as well as some public comments, expressed other concerns about the Proposed Action, largely involving procedural or administrative considerations rather than environmental consequences. Some

people thought the Proposed Action would increase the complexity, cost or rigidity of management without comparable benefits for lynx. These concerns have been addressed by developing different language in alternatives and are summarized below.

Standard VEG S1 says if more than 30 percent of the lynx habitat in an LAU is in an *unsuitable condition,* then vegetation management projects cannot make more unsuitable. *Unsuitable lynx habitat* consists of young regenerating forests where the trees and brush are generally less than ten to 30 years old and have not yet grown tall enough to protrude above the snow in winter.

Natural disturbance processes tend to be larger than an LAU in the Northern Rockies. Some people said that if management actions were supposed to emulate natural processes – especially with prescribed burns – then some scale larger than one LAU should be used to apply the 30 percent standard.

Standard VEG S2 limits changes caused by timber harvest in a 10-year period. Some people said Standard VEG S2 should not single out a specific management practice, when other practices can have the same result.

Standard VEG S3 defers vegetation management projects in places with the potential to develop into denning habitat if an LAU contains less than ten percent denning habitat. *Guideline VEG G2* recommends leaving standing trees and coarse woody debris where more denning habitat is desired. Some people said Standard VEG S3 should be modified to provide for more denning habitat without deferring activities.

Standard VEG S4 limits salvage harvest in some situations. Some people said Standard VEG S4 should not single out a specific management practice, when other practices can have the same result.

Standards VEG S5 and *VEG S6* limit precommercial thinning in winter snowshoe hare habitat. They would restrict precommercial thinning done for research and genetic test sites. Research to find how snowshoe hares respond to various kinds and levels of thinning has been identified as an information need; information from genetic test sites is needed to evaluate which trees grow the best. Some people said that since these activities affect such a small acreage, they should be allowed.

Guideline VEG G1 recommends creating forage where it's lacking. Some people said more guidance was needed about what stand conditions should be targeted to create forage.

Standard HU S1 allows adjusting groomed and designated over-the-snow routes within an individual LAU. Since trail systems frequently cover multiple LAUs, some people said it would be difficult to manage trails inside a single LAU.

Standard HU S2 requires lynx diurnal security habitat to be provided when developing or expanding ski areas. The LCAS recognized this as less of a problem in the Northern Rockies Geographic Area than in some other parts of the lynx range. Some people said an alternative should recognize this.

Guideline HU G6 discourages creating more high-traffic roads and highways, by recommending avoiding upgrades to unpaved roads if they would result in increased traffic speeds and volumes. Some people said this guideline ignored other environmental or safety considerations.

The *Lynx Conservation Agreement*, which is currently in effect, prohibits projects that would adversely affect lynx. Although recommendations in the LCAS are used as a basis for evaluating the effects of proposed projects, strict compliance with the LCAS is not required if the effects are not adverse.

Once the lynx amendment is in place, projects would have to comply with amendment standards even if the result of not complying would not lead to adverse effects. Some people said an alternative should be considered that does not give up this flexibility. A new standard, Standard ALL S2, was added to provide this flexibility.

Range of alternatives

NEPA regulations at 40 CFR 1502.14(a) say an environmental impact statement must

> *...rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons ...*

The courts have established that this does not mean every conceivable alternative must be considered, but that the selection and discussion of alternatives must permit a reasoned choice and foster informed public participation and decision-making.

Whether an alternative is *reasonable* is primarily determined by whether it meets the Purpose and Need and whether it represents a distinctly different approach in responding to issues.

The range of alternatives presented in this chapter was determined by evaluating the comments and the Purpose and Need; and considering the level of scientific information available to warrant a different approach, the Listing Decision and ESA requirements. Within these parameters, the alternatives developed display a reasonable range to guide future projects, respond to the issues and meet the Purpose and Need.

When the alternatives were being developed, suggested objectives, standards and guidelines were considered if they addressed the primary issues or management concerns. These comments were screened to see if:

- They met the Purpose and Need, and if so
- Whether they provided approaches different from those already included in other alternatives.

Those that did not meet both tests are discussed later in this chapter as *Management direction considered, but not developed in detail*, where the reasons are explained why they were not developed further. These partially developed alternatives contribute to the reasonable range and reasoned choice, even though they were eliminated from further consideration.

Alternatives developed in detail

Alternative A, no action

Analyzing a no-action alternative is a requirement of NEPA at 40 CFR 1508.14(d), and of BLM and FS planning procedures. In this case, no action means no change, no amendment to existing plans. This analysis considers the effects of the existing plans as written including any previous amendments.

The no-action alternative does not include the conservation measures in the LCAS. While the FS and BLM have been following the Conservation Agreements they signed with the FWS and considering the LCAS when evaluating projects, the LCAS measures have not been incorporated as plan direction. A decision to adopt Alternative A would not adopt the measures of the LCAS, but also would not void the Conservation Agreements or the requirements of ESA.

The comparison of alternatives focuses on the changes in effects that result from adding lynx management direction. The proposed measures are considered individually, as well as collectively. They may be selected individually or not. A decision to not adopt some of the lynx management direction would be a decision to select part of Alternative A.

Alternative B, the Proposed Action

The Proposed Action was developed from conservation measures recommended in the LCAS. Appendix A is a crosswalk between the LCAS, the scoping proposed action and the DEIS Proposed Action, Alternative B.

Alternative B addresses activities on NF and BLM lands that can affect lynx and their habitat. The exact language is in Table 2-1.

Timber and wildland fire management

Timber and wildland fire management both can affect the amount of winter snowshoe hare and denning habitat. Alternative B would add management direction to provide certain habitat conditions – see the *Lynx* section of Chapter 3 for more thorough descriptions and explanations of stand conditions.

Objectives describe desired conditions.

- Objectives VEG O1 and VEG O3 focus on using fire and timber management to emulate historic processes.
- Objective VEG O2 says winter snowshoe hare habitat should be near denning habitat.
- Objectives VEG O3 and VEG O4 encourage using fire and timber

management to develop winter snowshoe hare habitat.

Standards set sideboards for projects. The vegetation standards do not apply to fire suppression or to wildland fire use.

- Standard VEG S1 limits to 30 percent in an LAU, the amount of lynx habitat that can be in an unsuitable condition. *Unsuitable lynx habitat* is young regenerating forests where the trees are generally less than ten to 30 years old and the vegetation has not yet grown tall enough to support snowshoe hares during all seasons. It will grow into winter snowshoe hare habitat over time.

  Standard VEG S1 is meant to ensure lynx habitat is maintained at the scale of a lynx home range. Standard VEG S1 is based on general information about historic conditions (Brittel et al. 1989) and would not apply if a broadscale assessment substantiated different historical levels. The amount of lynx habitat in an unsuitable condition on private lands is considered in this standard.

- Standard VEG S2 limits to 15 percent in ten years the amount of lynx habitat in an LAU that can be made unsuitable because of timber harvest. Timber harvest is not an exact ecological substitute for natural disturbance processes (Ruediger et al. 2000 p. 2-2 to 2-3). Limiting the amount of timber harvest would let natural disturbance processes – fire and insect and diseases – play their historic roles producing unsuitable habitat, and later, foraging conditions.

- Standards VEG S3 and VEG S4 direct maintaining denning habitat and limiting salvage harvest that may remove potential denning sites.

- Standards VEG S5 and VEG S6 limit precommercial thinning so that existing winter snowshoe hare habitat would be maintained. Thinning would be allowed for safety and protecting property.

Guidelines identify ways to meet the objectives.

- Guideline VEG G1 encourages managers to create winter snowshoe hare habitat where it's lacking.

- Guidelines VEG G2 and VEG G3 say providing denning habitat close to foraging habitat should be considered when designing timber and fire projects.

- Guideline VEG G4 says the result of prescribed fire or wildland fire use should not be new trails that lead to more snow compaction or permanent firebreaks built on ridges and saddles.

- Guideline VEG G5 says habitat for red squirrels should be provided.

Livestock grazing
Livestock grazing may reduce winter snowshoe hare habitat especially where young regenerating forests are re-growing in stands of aspen and riparian areas. Livestock grazing also may reduce shrub-steppe habitat, which provides cover and prey for lynx when they're traveling.

- Objective GRAZ O1 says grazing should be managed in a way that maintains or improves lynx habitat.
- Standard GRAZ S1 says to make sure shrubs and trees can re-grow.
- Standard GRAZ S2 says to make sure aspen can survive.
- Standards GRAZ S3 and GRAZ S4 say that historic conditions should be emulated in riparian areas and shrub-steppe habitats.

Human uses
Recreational use, forest backcountry roads and trails and other human developments may reduce lynx habitat connectivity, or by compacting snow, provide a way for competing predators to move into lynx habitat.

- Objective HU O1 and Guideline HU G4 say to discourage new snow-compacting activities in lynx habitat.
- Objectives HU O2, HU O4 and HU O5, and Guidelines HU G1, HU G2, HU G3 and HU G5, say to provide lynx habitat in association with human uses and developments.
- Objectives HU O2, HO O3, HU O4, HU O5 and HU O6, and Guidelines HU G2, HU G3, HU G6, HU G7, HU G8 and HU G9 say to maintain lynx habitat connectivity.
- Standard HU S1 would stop the agencies from encouraging snow-compacting recreation in new areas, but would not limit existing use.
- Standard HU S3 limits winter access for special uses other than recreation and for mining and drilling.
- Standard HU S2 says ski area expansions shall provide diurnal security habitat.

Highways and private land developments
Highways and private land developments may affect lynx connectivity or mortality. The following direction applies only to the FS and BLM, but encourages cooperation with others.

- Objectives ALL O1 and LINK O1 say to provide lynx habitat connectivity.
- Objective LINK O1 says to work with other landowners.
- Standard ALL S1 says to make sure developments and vegetative management projects provide connectivity.

- Standard LINK S1 says to identify highway crossings.
- Standard LINK S2 says to manage shrub-steppe habitats in ways that provide connectivity.
- Guideline ALL G1 says highway-crossing structures should be used to provide connectivity.
- Guideline LINK G1 says lynx habitat should be retained in public ownership.

Alternative C

Alternative C was designed to respond to issues of over-the-snow recreation management and foraging habitat in multistoried forests, while providing a comparable level of protection to lynx as Alternative B, the Proposed Action. The changes from Alternative B are:

- Standard VEG S1 was changed to increase the scale at which it's applied. Alternative C would apply the 30 percent standard either to an LAU or to a fixed combination of adjacent LAUs, so disturbance processes like fire could be factored in. Under Alternative C, the standard would not limit the use of prescribed fire.
- Standard VEG S2 was changed to a guideline – while the agencies must comply with a standard, they may deviate from a guideline. Analysis indicated that timber harvest has caused very few LAUs to exceed 15 percent unsuitable (Hillis et al. 2003). Some people thought timber harvest should not be singled out since unsuitable conditions can be created by prescribed fire as well.
- Standard VEG S4 was changed to allow salvage logging in disturbed areas smaller than five acres, when such areas are within 200 feet of dwellings and outbuildings. This would let commercial operators clear dead or dying trees to treat fuels.
- Standards VEG S5 and VEG S6 were changed to apply to all vegetation management, not just precommercial thinning, and to allow research projects and genetic tests. The LCAS did not say to limit all activities that could reduce winter snowshoe hare habitat in multistoried stands.
- Guideline VEG G1 was changed to give priority to managing vegetation in mid-aged or mature forests that have little understory or few dead trees. Analysis indicates an abundance of this kind of forest in the amendment area, and it's of relatively low value to lynx.
- Standard HU S1 was changed to increase the scale at which it would be applied to consolidate use and improve lynx habitat. The no-net-increase standard for groomed or designated routes

would be applied either to an LAU or to a fixed combination of immediately adjacent LAUs.

Standard HU S1 also was changed to let groomed or designated trails expand into areas or routes where snow was already compacted, as identified in the baseline of 1998 through 2000. This would allow increased use where snow is already compacted.

- Standard HU S2 was changed to a guideline. Not all ski areas need to provide diurnal security habitat; it can be provided next to ski areas, not just inside them. Diurnal security habitat does need to be taken into consideration when ski areas are developing or expanding.
- Guideline HU G6 changed its emphasis from *avoiding* to *mitigating* upgrading roads, where upgrades would lead to substantial increases in traffic volumes or speeds. Some upgrades may be proposed to reduce dust or to ensure safety and reduce maintenance.

Alternative D

Alternative D was designed to address the issues of managing over-the-snow recreation and multistoried forests, similar to Alternative C. Alternative D also allows some precommercial thinning in winter snowshoe hare habitat, but still contributes to lynx conservation. The changes from Alternative B are:

- Standard ALL S2 was added which would allow any project to go forward if it deviates from a lynx standard with a "not likely to adversely affect" determination, subject to ESA requirements and to review by the FS Regional Forester or BLM State Director.
- Standard VEG S1 was changed to further increase the scale at which it's applied. Alternative D would apply the 30 percent standard at the scale of a sub-basin or an isolated mountain range.
- Standard VEG S2 was dropped.
- Standard VEG S3, deferring vegetation management where less than ten percent denning habitat was available, was changed to allow projects if they leave enough standing trees and large down woody material for den sites.
- Standard VEG S4 was changed to a less-restrictive guideline that says salvage logging should be limited after a disturbance kills trees in areas of five acres or less. Leaving small dead patches should be considered if less than ten percent denning habitat is available in an LAU.
- Standards VEG S5 and VEG S6 were changed to apply to all

vegetation management, not just precommercial thinning. Thinning would be allowed in the same cases as Alternative C, plus thinning could be done to favor certain tree species.

- In young regenerating forests, *daylight thinning* could take place around western larch, ponderosa pine and planted western white pine if 80 percent of the cover was retained – this would retain some of the value as snowshoe hare cover and forage, and give these disturbance-adapted species a better chance to grow into large mature trees. VEG S5 would let aspen restoration projects take place in young regenerating forests.

  Both standards would allow whitebark pine restoration projects, including thinning and prescribed burning. Both would allow thinning anywhere there's already an abundance of snowshoe hare forage, and projects that would encourage lodgepole pine to develop old-growth characteristics.

  Standard VEG S6 would permit some short-term reduction of foraging habitat in older stands, allowing logging or prescribed fire to create openings that would improve or maintain foraging habitat in the long term.

- Guideline VEG G1 changed the same as under Alternative C.
- Guideline VEG G2 was dropped – it's included as a mitigation measure under Standard VEG S3.
- Standards HU S1 and HU S2 and Guideline HU G6 were changed the same as under Alternative C.

Alternative E, the Preferred Alternative

Alternative E addresses the issue of wildland fire risk while contributing to lynx conservation. It also responds to statements made in FWS's Remand Notice that the effects of grazing, minerals, forest roads and over-the-snow activities do not affect lynx populations. Appendix N identifies the management direction applicable to Alternative E, the Preferred Alternative.

The changes from Alternative B are:

- As with Alternative D, Standard ALL S2 was added that would allow a project to go forward if it deviates from a lynx standard with a "not likely to adversely affect" determination, subject to ESA requirements. Under Alternative E, the standard would allow a project to go forward if it deviates from a lynx standard and results in short-term adverse effects, but has long term beneficial effects on lynx. No higher level of review would be required.
- Standard VEG S1 was changed to increase the scale at which it's applied. As with Alternative C, Alternative E would apply the 30

percent standard either to an LAU or a fixed combination of adjacent LAUs. Under Alternative E, the standard would allow all fuel treatments.

- Standard VEG S2 was dropped, the same as under Alternative D.
- Standard VEG S3 was changed, as with Alternative D, to allow projects where less than ten percent denning habitat is available if enough standing trees or large down woody material is left for den sites. Under Alternative E, the standard would allow all fuel treatments.
- Standard VEG S4 was changed the same as under Alternative D.
- As with Alternative B, Standard VEG S5 would apply only to precommercial thinning. Under Alternative E, the standard would allow all fuel treatments that use precommercial thinning.
- Standard VEG S6 was dropped, and the management direction included in Guideline VEG G8.
- Guideline VEG G1 was changed the same as under Alternative C.
- Guideline VEG G2 was dropped the same as under Alternative D – it's included as a mitigation measure under Standard VEG S3.
- Standards GRAZ S1, S2, S3 and S4 were dropped and the management direction included in Guidelines GRAZ G1, G2, G3, and G4. Standard LINK S2 was dropped, and the management direction included in Guideline LINK G2.
- Standard HU S1 was dropped, and the management direction included in Guideline HU G11.
- Standards HU S2 and Guideline HU G6 were changed the same as with Alternative C.
- Standard HU S3 was dropped, and the management direction included in Guideline HU G12

Features common to all alternatives

Table 2-1 on the following page shows the differences between the action alternatives, Alternatives B, C, D and E.

The goals, objectives, standards and guidelines would apply only to NF and BLM lands, and would be incorporated into the existing plans. If a conflict exists between this management direction and an existing plan, the more restrictive direction would apply.

Table 2-1. Crosswalk between Alternative B, the Proposed Action, and the other action alternatives C, D & E

Differences between the alternatives have been *italicized*.

If a conflict exists between this management direction and an existing plan, the more restrictive direction applies.

Alternative B	Alternative C	Alternative D	Alternative E
ALL PROGRAMS & ACTIVITIES – applies to lynx habitat[19] in LAUs[17] & linkage areas[18]18, subject to valid existing rights			
Goal[12] Conserve the Canada lynx.	Same	Same	Same
Objective[25] ALL O1 Maintain[22] or restore[33] lynx habitat[19] connectivity[14] in and between LAUs[17], and in linkage areas[18].	Same	Same	Same
Standard[36] ALL S1 New or expanded permanent developments[28] and vegetation management projects[41] must maintain[22] habitat connectivity[14].	Same	Same	Same
Standard ALL S2 None	None	A project proposal that deviates from one or more lynx standards may proceed without amending the plan, subject to ESA requirements, if a written determination is made that the project is not likely to adversely affect lynx. The regional forester or BLM state director must approve any project proposed under this measure before the decision is made.	A project proposal that deviates from one or more lynx standards may proceed without amending the plan, subject to ESA requirements, *either:* *1.* If a written determination is made that the project is not likely to adversely affect lynx; or 2. *If it may result in short-term adverse effects on lynx but if long-term benefits to lynx and its habitat would result.*
Guideline[13] ALL G1 Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways[15] or forest highways[10] across federal land. Methods could include fencing, underpasses or overpasses.	Same	Same	Same

Alternative B	Alternative C	Alternative D	Alternative E
SPECIFIC PROGRAMS & ACTIVITIES – applies only to lynx habitat [19] in LAUs[17], subject to valid existing rights - LAU boundaries			
Standard[36] LAU S1 LAU[17] boundaries will not be adjusted except through agreement with the FWS, based on new information about lynx habitat[19].	Same	Same	Same
Vegetative management activities & practices			
Objective[25] VEG O1 Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.	Same	Same	Same
Objective VEG O2 Maintain or improve lynx habitat[19], emphasizing high-quality winter snowshoe hare habitat[42] near denning habitat[4].	Same	Same	Same
Objective VEG O3 Conduct fire use[9] activities to restore[33] ecological processes and maintain or improve lynx habitat.	Same	Same	Same
Objective VEG O4 Design regeneration harvest, reforestation and thinning to develop characteristics suitable for winter snowshoe hare habitat.	Same	Same	Same

Alternative B	Alternative C	Alternative D	Alternative E
Standard[36] VEG S1 Unless a broad scale assessment[2] has been completed that substantiates different historic levels of unsuitable habitat[20], limit disturbance in each LAU[17] as follows: If more than 30 percent of the lynx habitat[19] in an LAU is currently in unsuitable condition, no additional habitat may be made unsuitable by vegetation management projects[41].	Standard VEG S1 Unless a broad scale assessment has been completed that substantiates different historic levels of unsuitable habitat, limit disturbance in each LAU *or in a combination of immediately adjacent LAUs* as follows: If more than 30 percent of the lynx habitat in an LAU *or a combination of immediately adjacent LAUs* is currently in unsuitable condition, no additional habitat may be made unsuitable by vegetation management projects. This standard does not apply to prescribed fire[29]. *Use the same analysis boundaries for all vegetation management projects subject to this standard.*	Standard VEG S1 Unless a broad scale assessment has been completed that substantiates different historic levels of unsuitable habitat, limit disturbance in *each sub-basin or isolated mountain range*[16] as follows: If more than 30 percent of the lynx habitat *in a sub-basin or isolated mountain range* is currently in unsuitable condition, no additional habitat may be made unsuitable by vegetation management projects. Use the same analysis boundaries for all vegetation management projects subject to this standard.	Standard VEG S1 Unless a broad scale assessment has been completed that substantiates different historic levels of unsuitable habitat, limit disturbance in each LAU *or in a combination of immediately adjacent LAUs* as follows: If more than 30 percent of the lynx habitat in an LAU *or a combination of immediately adjacent LAUs* is currently in unsuitable condition, no additional habitat may be made unsuitable by vegetation management projects. *This standard does not apply to fuel treatment[11] projects identified through processes such as that described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan.* Use the same analysis boundaries for all vegetation management projects subject to this standard.
Standard VEG S2 Timber management projects[39] shall not change more than 15 percent of the lynx habitat on NFS or BLM lands in an LAU to an unsuitable condition in a ten-year period.	*None* *See Guideline VEG G6*	*None*	None
Standard VEG S3 Maintain[22] at least ten percent of the lynx habitat in an LAU as denning habitat[4] in patches generally larger than five acres.	Same as Alt B	Standard VEG S3 Maintain at least ten percent of the lynx habitat in an LAU as denning habitat in patches generally larger than five acres.	Standard VEG S3 Maintain at least ten percent of the lynx habitat in an LAU as denning habitat in patches generally larger than five acres.

Alternative B	Alternative C	Alternative D	Alternative E
Where less than ten percent denning habitat is present in an LAU, defer vegetation management projects in stands that have the highest potential to develop denning habitat.		Where less than ten percent denning habitat is present in an LAU, *either:* *1.* Defer vegetation management projects in stands that have the highest potential to develop denning habitat; *or* 2. *Move towards ten percent denning habitat by leaving enough standing trees and coarse woody debris to be similar to what would be there naturally.*	Where less than ten percent denning habitat is present in an LAU, either: 1. Defer vegetation management projects in stands that have the highest potential to develop denning habitat; or 2. Move towards ten percent denning habitat by leaving enough standing trees and coarse woody debris to be similar to what would be there naturally. *This standard does not apply to fuel treatment projects identified through processes such as that described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan.*
Standard VEG S4 After a disturbance kills trees in areas five acres or smaller that could contribute to lynx denning habitat, salvage harvest[34] may occur only in: 1. Developed recreation[7] sites, administrative sites, or authorized special use structures or improvements; or 2. Designated road or trail corridors where public safety or access has been or may be compromised; or 3. LAUs where denning habitat has been mapped and field-validated, provided at least ten percent is retained and well distributed.	Standard VEG S4 After a disturbance kills trees in areas five acres or smaller that could contribute to lynx denning habitat, salvage harvest may occur only in: 1. Developed recreation sites, administrative sites, or authorized special use structures or improvements; or 2. Designated road or trail corridors where public safety or access has been or may be compromised; or 3. LAUs where denning habitat has been mapped and field-validated, provided at least ten percent is retained and well distributed; or 4. *Within 200 feet of dwellings or outbuildings.*	*None* *See Guideline VEG G7*	None See Guideline VEG G7

Alternative B

Standard VEG S5

Precommercial thinning[30] projects that reduce winter snowshoe hare habitat[42] during the stand initiation structural stage[37] may occur only:

1. Within 200 feet of administrative sites, dwellings or outbuildings.

NOTE: Some thinning projects, such as white pine pruning or Christmas tree harvest, may occur if winter snowshoe hare habitat is not reduced.

Alternative C

Standard VEG S5

Vegetation management projects that reduce winter snowshoe hare habitat during the stand initiation structural stage may occur only:

1. Within 200 feet of administrative sites, dwellings or outbuildings; or
2. *For research studies[32] or genetic tree tests evaluating genetically improved reforestation stock.*

NOTE: Some vegetation management projects, such as white pine pruning or Christmas tree harvest, may occur if winter snowshoe hare habitat is not reduced.

Alternative D

Standard VEG S5

Vegetation management projects that reduce winter snowshoe hare habitat during the stand initiation structural stage may occur only:

1. Within 200 feet of administrative sites, dwellings or outbuildings; or
2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or
3. *For daylight thinning[3] of planted rust-resistant white pine where 80 percent of the winter snowshoe hare habitat is retained; or*
4. *To restore[33] whitebark pine; or*
5. *For daylight thinning to release larch or ponderosa pine where 80 percent of the winter snowshoe hare habitat is retained; or*
6. *To develop future old growth[27] characteristics in lodgepole; or*
7. *When a broad scale assessment[2] determines that the amount winter snowshoe hare habitat in the stand initiation stage exceeds what would be expected under the normal range of historic conditions; or*
8. *For conifer removal in aspen or daylight thinning around individual aspen trees.*

NOTE: Appendix G includes examples of 3, 5, 6 and 7.

Alternative E

Standard VEG S5

Precommercial thinning[30] projects that reduce winter snowshoe hare habitat during the stand initiation structural stage may occur only:

1. Within 200 feet of administrative sites, dwellings or outbuildings; or
2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or
3. *For fuel treatment projects identified through processes such as that described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan.*

Alternative B

Standard VEG S6

Precommercial thinning projects that reduce winter snowshoe hare habitat during the understory-reinitiation[40] or old-multistory structural stages[26] may occur only:

1. Within 200 feet of administrative sites, dwellings or outbuildings.

Alternative C

Standard VEG S6

Vegetation management projects[41] that reduce winter snowshoe hare habitat during the understory-reinitiation or old-multistory structural stages may occur only:

1. Within 200 feet of administrative sites, dwellings or outbuildings; or
2. For research studies[32].

Alternative D

Standard VEG S6

Vegetation management projects that reduce winter snowshoe hare habitat during the understory-reinitiation or old-multistory structural stages may occur only:

1. Within 200 feet of administrative sites, dwellings or outbuildings; or
2. For research studies; or
3. *To maintain planted rust-resistant white pine where 80 percent of the winter snowshoe hare habitat is retained; or*
4. *To restore whitebark pine; or*
5. *To release larch or ponderosa pine where 80 percent of the winter snowshoe hare habitat is retained; or*
6. *To develop future old growth characteristics in lodgepole; or*
7. *When a broad scale assessment*[2] *determines that the amount of winter snowshoe hare habitat in multistory structural stages exceeds what would be expected under the normal range of historic conditions.*
8. *When improving or maintaining winter snowshoe hare habitat in the long term.*

NOTE: Appendix G includes examples of 3, 5 and 6.

Alternative E

None

See Guideline VEG G8

Alternative B	Alternative C	Alternative D	Alternative E
Guideline[13] VEG G1 Vegetation management projects[41] should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available. Winter snowshoe hare habitat [42] should be near denning habitat[4]. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining.	Guideline VEG G1 Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available *Priority should be given to stem-exclusion, closed-canopy structural stage*[38]. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining.	Same as Alt C	Same as Alt C
Guideline VEG G2 Where more denning habitat is desired, leave standing trees and coarse woody debris in amounts similar to what would be there naturally. Denning habitat should be near winter snowshoe hare habitat.	Same	*None* *See Standard VEG S3*	None See Standard VEG S3
Guideline VEG G3 Vegetation management projects designed to retain or restore[33] denning habitat should be located where there is a low probability of stand-replacing fire.	Same	Same	Same
Guideline VEG G4 Fire use[9] activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.	Same	Same	Same

Alternative B	Alternative C	Alternative D	Alternative E
Guideline VEG G5 Habitat for alternate prey species, primarily red squirrel[31], should be provided in each LAU.	Same	Same	Same
None See Standard VEG S2	*Guideline VEG G6* *Timber management projects[39] should not change more than 15 percent of the lynx habitat in an LAU into an unsuitable condition during a ten-year period.*	None	None
None See Standard VEG S4	None See Standard VEG S4	*Guideline VEG G7* *After a disturbance that kills trees in areas five acres or smaller which could contribute to lynx denning habitat, salvage harvest[34] should not occur unless at least ten percent denning habitat in an LAU is retained and well distributed.*	Same as Alt D
None See Standard VEG S6	None See Standard VEG S6	None See Standard VEG S6	Guideline VEG G8 *Vegetation management projects[41] should provide habitat conditions through time that maintain[22] winter snowshoe hare habitat[42] during the understory reinitiation[40] or old-multistory structural stages. Vegetation management projects should be used to improve lynx habitat where dense understories are lacking.*

Alternative B	Alternative C	Alternative D	Alternative E
Livestock grazing activities & practices			
Objective[25] GRAZ O1 Manage livestock grazing to be compatible with improving or maintaining[22] lynx habitat[19].	Same	Same	Same
Standard[36] GRAZ S1 In fire- and harvest-created openings, manage livestock grazing to make sure impacts do not prevent shrubs and trees from regenerating.	Same	Same	*None* *See Guideline GRAZ G1*
Standard GRAZ S2 In aspen stands, manage livestock grazing to contribute to their long-term health and sustainability.	Same	Same	*None* *See Guideline GRAZ G2*
Standard GRAZ S3 In riparian areas and willow carrs, manage livestock grazing to contribute to maintaining or achieving a preponderance of mid- or late-seral stages[24], similar to conditions that would have occurred under historic disturbance regimes.	Same	Same	*None* *See Guideline GRAZ G3*
Standard GRAZ S4 In shrub-steppe habitats[35], manage livestock grazing in the elevation ranges of forested lynx habitat[19] in LAUs[17], to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	Same	Same	*None* *See Guideline GRAZ G4*

Alternative B	Alternative C	Alternative D	Alternative E
None See Standard GRAZ S1	Same	Same	Guideline[13] GRAZ G1 *In fire- and harvest-created openings, livestock grazing should be managed so that impacts do not prevent shrubs and trees from regenerating.*
None See Standard GRAZ S2	Same	Same	Guideline GRAZ G2 *In aspen stands, livestock grazing should be managed to contribute to their long-term health and sustainability.*
None See Standard GRAZ S3	Same	Same	Guideline GRAZ G3 *In riparian areas and willow carrs, livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages[24], similar to conditions that would have occurred under historic disturbance regimes.*
None See Standard GRAZ S4	Same	Same	Guideline GRAZ G4 *In shrub-steppe habitats[35], livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs, to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.*

Alternative B	Alternative C	Alternative D	Alternative E
Human uses management activities & practices			
Objective[25] HU O1 Maintain[22] the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat[19].	Same	Same	Same
Objective HU O2 Manage recreational activities to maintain lynx habitat and connectivity.	Same	Same	Same
Objective HU O3 Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat.	Same	Same	Same
Objective HU O4 Provide for lynx habitat needs and connectivity when developing new or expanding existing developed recreation[7] sites or ski areas.	Same	Same	Same
Objective HU O5 Manage human activities – such as exploring and developing minerals and oil and gas, placing utility corridors and permitting special uses – to reduce impacts on lynx and lynx habitat.	Same	Same	Same
Objective HU O6 Reduce adverse highway[15] effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity[14], and to reduce the potential of lynx mortality.	Same	Same	Same

Alternative B	Alternative C	Alternative D	Alternative E
Standard[36] HU S1 Allow no net increase in designated over-the-snow routes[5] or play areas by LAU[17], unless designation serves to consolidate use and improve lynx habitat[19]. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings or where regulated by HU S3.	Standard HU S1 Allow no net increase in designated over-the-snow routes or play areas *outside baseline areas of consistent snow compaction*[1] by LAU *or in a combination of immediately adjacent LAUs*, unless designation serves to consolidate use and improve lynx habitat. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings or to access regulated by HU S3. *Use the same analysis boundaries for all actions subject to this standard.*	Same as Alt C	*None* *See Guideline HU G11*
Standard HU S2 When developing or expanding ski areas, locate trails, access roads and lift termini to maintain[22] and provide lynx diurnal security habitat[8] if it's been identified as a need.	*None* *See Guideline HU G10*	None See Guideline HU G10	None See Guideline HU G10
Standard HU S3 Winter access for non-recreation special uses and mineral and energy exploration and development, shall be limited to designated routes[6] or designated over-the-snow routes[5].	Same	Same	*See Guideline HU G12*
Guideline[13] HU G1 When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat[42] is maintained.	Same	Same	Same

Alternative B	Alternative C	Alternative D	Alternative E
Guideline HU G2 When developing or expanding ski areas, nocturnal foraging should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.	Same	Same	Same
Guideline HU G3 Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.	Same	Same	Same
Guideline HU G4 For mineral and energy development sites and facilities, remote monitoring should be encouraged to reduce snow compaction.	Same	Same	Same
Guideline HU G5 For mineral and energy development sites and facilities that are closed, a reclamation plan that restores[33] lynx habitat should be developed.	Same	Same	Same
Guideline HU G6 Upgrading unpaved roads to maintenance levels[23] 4 and 5 should be avoided in lynx habitat, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.	Guideline HU G6 *Methods to avoid or reduce effects on lynx should be used in lynx habitat when* upgrading unpaved roads to maintenance levels 4 or 5, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.	Same as Alt C	Same as Alt C

Alternative B	Alternative C	Alternative D	Alternative E
Guideline HU G7 New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity[14]. New permanent roads and trails should be situated away from forested stringers.	Same	Same	Same
Guideline HU G8 Cutting brush along low-speed[21], low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.	Same	Same	Same
Guideline HU G9 On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.	Same	Same	Same
None See Standard HU S2	*Guideline HU G10* *When developing or expanding ski areas and trails, access roads and lift termini should be located to maintain and provide lynx diurnal security[8] habitat.*	Same as Alt C	Same as Alt C

Alternative B	Alternative C	Alternative D	Alternative E
None See Standard HU S1	Same	Same	Guideline HU G11 *Designated over-the-snow routes[5] or play areas should not expand outside baseline areas of consistent snow compaction[1] by LAU or in a combination of immediately adjacent LAUs, unless designation serves to consolidate use and improve lynx habitat.* *This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings or where regulated by HU G12.* *Use the same analysis boundaries for all actions subject to this guideline.*
None See Standard HU S3	Same	Same	Guideline HU G12 *Winter access for non-recreation special uses and mineral and energy exploration and development, should be limited to designated routes[6] or designated over-the-snow routes[5]*

Alternative B	Alternative C	Alternative D	Alternative E
LINKAGE AREAS – applies to linkage areas[18], subject to valid existing rights			
Objective[25] LINK O1 In areas of intermingled land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat.	Same	Same	Same
Standard[36] LINK S1 When highway[15] or forest highway[10] construction or reconstruction is proposed in linkage areas[18], identify potential highway crossings.	Same	Same	Same
Standard LINK S2 Manage livestock grazing in shrub-steppe habitats[35] to contribute to maintaining[22] or achieving a preponderance of mid- or late-seral stages[24], similar to conditions that would have occurred under historic disturbance regimes.	Same	Same	*None* *See Guideline LINK G2*
Guideline[13] LINK G1 NFS and BLM lands should be retained in public ownership.	Same	Same	Same
None See Standard LINK S2	Same	Same	Guideline LINK G2 *Livestock grazing in shrub-steppe habitats should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages[24], similar to conditions that would have occurred under historic disturbance regimes.*

Alternative B	Alternative C	Alternative D	Alternative E
Monitoring			
Map the location and amount of snow-compacting use that coincided with lynx habitat[19] in LAUs[17] during the 1998-2000 seasons for designated over-the-snow[5] and groomed routes and areas, and areas of consistent snow compaction[1]. Such activities include snowmobiling, snowshoeing, cross-country skiing, dog sledding, etc.	Same as Alt B	Same as Alt B	Same as Alt B
None	None	*Annually monitor the acres of vegetation management projects[41] that occurred in lynx habitat and in winter snowshoe hare habitat[42] during the previous fiscal year.*	Same as Alt D
None	None	*Document and evaluate the conditions under which Standard All S2 is applied.*	Same as Alt D

Glossary

[1] *Areas of consistent snow compaction* – An area of consistent snow compaction is an area of land or water that during winter is generally covered with snow and gets enough human use that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after (within 48 hours) snowfall. These can be areas or linear routes, and are generally found in near snowmobile or cross-country ski routes, in adjacent openings, parks and meadows, near ski huts or plowed roads, or in winter parking areas. Areas of consistent snow compaction will be determined based on the area or miles used in 1998, 1999 or 2000.

[2] *Broad scale assessment* – A broad scale assessment is a synthesis of current scientific knowledge, including a description of uncertainties and assumptions, to provide an understanding of past and present conditions and future trends, and a characterization of the ecological, social and economic components of an area. (LCAS)

[3] *Daylight thinning* – Daylight thinning is a form of precommercial thinning that removes the trees and brush inside a given radius around a tree.

[4] *Denning habitat (lynx)* – Denning habitat is the environment lynx use when giving birth and rearing kittens until they are mobile. The most common component is large amounts of coarse woody debris to provide escape and thermal cover for kittens. Denning

habitat must be within daily travel distance of winter snowshoe hare habitat – the typical maximum daily distance for females is about three to six miles. Denning habitat includes mature and old growth[24] forests with plenty of coarse woody debris. It can also include young regenerating forests with piles of coarse woody debris, or areas where down trees are jack-strawed.

[5] *Designated over-the-snow routes* – Designated over-the-snow routes are routes managed under permit or agreement or by the agency, where use is encouraged, either by on-the-ground marking or by publication in brochures, recreation opportunity guides or maps (other than travel maps) or in electronic media produced or approved by the agency. The routes identified in outfitter and guide permits are designated by definition; groomed routes also are designated by definition. The determination of baseline snow compaction will be based on the miles of designated over-the-snow routes authorized, promoted or encouraged in 1998, 1999 or 2000.

[6] *Designated route* – A designated route is a road or trail that has been identified as open for specified travel use.

[7] *Developed recreation* – Developed recreation requires facilities that result in concentrated use. For example, skiing requires lifts, parking lots, buildings and roads; campgrounds require roads, picnic tables and toilet facilities.

[8] *Diurnal security habitat (lynx)* – Diurnal security habitat amounts to places in lynx habitat that provide secure winter daytime bedding sites for lynx in highly disturbed landscapes like ski areas. Security habitat gives lynx the ability to retreat from human disturbance during the day, so they can emerge at dusk to hunt when most human activity stops. Forest structures that make human access difficult generally discourage human activity in security habitats. Security habitats are most effective if big enough to provide visual and acoustic insulation and to let lynx easily move away from any intrusion. They must be close to winter snowshoe hare habitat. (LCAS)

[9] *Fire use* – Fire use is the combination of wildland fire use and using prescribed fire to meet resource objectives. (NIFC) Wildland fire use is managing naturally ignited wildland fires to accomplish resource management objectives in areas that have a fire management plan. This term replaces prescribed natural fire. (Wildland and Prescribed Fire Management Policy, August 1998)

[10] *Forest highway* – A forest highway is a forest road under the jurisdiction of, and maintained by, a public authority and open to public travel (USC: Title 23, Section 101(a)), designated by an agreement with the FS, state transportation agency and Federal Highway Administration.

[11] *Fuel treatment* – A fuel treatment is a management action that reduces the threat of ignition and fire intensity or rate of spread, or is used to restore fire-adapted ecosystems.

[12] *Goal* – A goal is a broad description of what an agency is trying to achieve, found in a land management plan. (LCAS)

[13] *Guideline* – A guideline is a particular management action that should be used to meet an objective found in a land management plan. The rationale for deviations may be documented, but amending the plan is not required. (LCAS modified)

[14] *Habitat connectivity (lynx)* – Habitat connectivity consists of an adequate amount of vegetative cover arranged in a way that allows lynx to move around. Narrow forested mountain ridges or shrub-steppe plateaus may serve as a link between more extensive areas of lynx habitat; wooded riparian areas may provide travel cover across open valley floors. (LCAS)

[15] *Highway* – The word highway includes all roads that are part of the National Highway System. (23 CFR 470.107(b))

[16] *Isolated mountain range* – Isolated mountain ranges are small mountains cut off from other mountains and surrounded by flatlands. On the east side of the Rockies, they are used for analysis instead of sub-basins. Examples are the Little Belts in Montana and the Bighorns in Wyoming.

[17] *LAU (Lynx Analysis Unit)* – An LAU is an area of at least the size used by an individual lynx, from about 25 to 50 mi2 (LCAS). An LAU is a unit for which the effects of a project would be analyzed; its boundaries should remain constant.

[18] *Linkage area* – A linkage area provides connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas, where basins, valleys or agricultural lands separate blocks of lynx habitat, or where lynx habitat naturally narrows between blocks. (LCAS updated definition approved by the Steering Committee 10/23/01)

[19] *Lynx habitat* – Lynx habitat occurs in mesic coniferous forest that experience cold, snowy winters and provide a prey base of snowshoe hare. In the northern Rockies, lynx habitat is generally occurs between 3,500 and 8,000 feet of elevation, and primarily consists of lodgepole pine, subalpine fir and Engelmann spruce. It may consist of cedar-hemlock in extreme northern Idaho, northeastern Washington and northwestern Montana, or of Douglas fir on moist sites at higher elevations in central Idaho. It may also consist of cool, moist Douglas fir, grand fir, western larch and aspen when interspersed in subalpine forests. Dry forests do not provide lynx habitat. (LCAS)

[20] *Lynx habitat in an unsuitable condition* –Lynx habitat in an unsuitable condition consists of lynx habitat in the stand initiation structural stage where the trees are generally less than ten to 30 years old and have not grown tall enough to protrude above the snow during winter. Stand replacing fire or certain vegetation management projects can create unsuitable conditions. Vegetation management projects that can result in unsuitable habitat include clearcuts and seed tree harvest, and sometimes shelterwood cuts and commercial thinning depending on the resulting stand composition and structure. (LCAS)

[21] *Low-speed, low-traffic-volume road* – Low speed is less than 20 miles per hour; low volume is a seasonal average daily traffic load of less than 100 vehicles per day.

[22] *Maintain* – In the context of this amendment, to maintain means to provide enough lynx habitat to conserve lynx. It does not mean to keep the status quo.

[23] *Maintenance level* – Maintenance levels define the level of service provided by and maintenance required for a road. (FSH 7709.58, Sec 12.3) Maintenance level 4 is assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. Some may be single lane; some may be paved or have dust

abated. Maintenance level 5 is assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-lane and paved, but some may be aggregate surfaced with the dust abated.

[24] *Mid-seral or later* – Mid-seral is the successional stage in a plant community that's the midpoint as it moves from bare ground to climax. For riparian areas, it means willows or other shrubs have become established. For shrub-steppe areas, it means shrubs associated with climax are present and increasing in density.

[25] *Objective* – An objective is a statement in a land management plan describing desired resource conditions and intended to promote achieving programmatic goals. (LCAS)

[26] *Old multistory structural stage* – Many age classes and vegetation layers mark the old forest, multistoried stage. It usually contains large old trees. Decaying fallen trees may be present that leave a discontinuous overstory canopy. On cold or moist sites without frequent fires or other disturbance, multi-layer stands with large trees in the uppermost layer develop. (Oliver and Larson, 1996)

[27] *Old growth* – Old growth forests generally contain trees that are large for their species and site, and are sometimes decadent with broken tops. Old growth often contains a variety of tree sizes, large snags and logs, and a developed and often patchy understory.

[28] *Permanent development* – A permanent development is any development that results in a loss of lynx habitat for at least 15 years. Ski trails, parking lots, new permanent roads, structures, campgrounds and many special use developments would be considered permanent developments.

[29] *Prescribed fire* – A prescribed fire is any fire ignited as a management action to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements met, before ignition. The term replaces management ignited prescribed fire. (NWCG)

[30] *Precommercial thinning* – Precommercial thinning is mechanically removing trees to reduce stocking and concentrate growth on the remaining trees, and not resulting in immediate financial return. (Dictionary of Forestry)

[31] *Red squirrel habitat* – Red squirrel habitat consists of coniferous forests of seed and cone-producing age that usually contain snags and downed woody debris, generally associated with mature or older forests.

[32] *Research* – Research consists of studies conducted to increase scientific knowledge or technology. For the purposes of Standards VEG S5 and VEG S6, research applies to studies financed from the forest research budget (FSM 4040) and administrative studies financed from the NF budget.

[33] *Restore, restoration* – To restore is to return or re-establish ecosystems or habitats to their original structure and species composition. (Dictionary of Forestry)

[34] *Salvage harvest* – Salvage harvest is a commercial timber sale of dead, damaged or dying trees. It recovers economic value that would otherwise be lost. Collecting firewood for personal use is not considered salvage harvest.

[35] *Shrub steppe habitat* – Shrub steppe habitat consists of dry sites with shrubs and grasslands intermingled.

[36] *Standard* – A standard is a required action in a land management plan specifying how to achieve an objective or under what circumstances to refrain from taking action. A plan must be amended to deviate from a standard.

[372] *Stand initiation structural stage* – The stand initiation stage generally develops after a stand-replacing disturbance by fire or regeneration timber harvest. A new single-story layer of shrubs, tree seedlings and saplings establish and develop, reoccupying the site. Trees that need full sun are likely to dominate these even-aged stands. (Oliver and Larson, 1996)

[38] *Stem exclusion structural stage* – In the stem exclusion stage, trees initially grow fast and quickly occupy all of the growing space, creating a closed canopy. Because the trees are tall, little light reaches the forest floor so understory plants (including smaller trees) are shaded and grow more slowly. Species that need full sunlight usually die; shrubs and herbs may become dormant. New trees are precluded by a lack of sunlight or moisture. (Oliver and Larson, 1996)

[39] *Timber management* – Timber management consists of growing, tending, commercially harvesting and regenerating crops of trees.

[40] *Understory re-initiation structural stage* – In the understory re-initiation stage, a new age class of trees gets established after overstory trees begin to die, are removed or no longer fully occupy their growing space after tall trees abrade each other in the wind. Understory seedlings then re-grow and the trees begin to stratify into vertical layers. A low to moderately dense uneven-aged overstory develops, with some small shade-tolerant trees in the understory. (Oliver and Larson, 1996)

[41] *Vegetation management projects* – Vegetation management projects change the composition and structure of vegetation to meet specific objectives, using such means as prescribed fire and timber harvest. For the purposes of this amendment, the term does not include removing vegetation for permanent developments like mineral operations, ski runs, roads and the like, and does not apply to fire suppression or to wildland fire use.

[42] *Winter snowshoe hare habitat* – Winter snowshoe hare habitat consists of places where young trees or shrubs grow dense – thousands of woody stems per acre – and tall enough to protrude above the snow during winter, so hares can browse on the bark and small twigs (Ruediger et al. 2000). Winter snowshoe hare habitat develops primarily in the stand initiation, understory reinitiation and old forest multistoried structural stages.

Management direction considered, but not in detail

Some public comments gave suggestions for management direction that would have created other alternatives. A number of such alternatives to management direction were considered but dismissed from detailed consideration.

The rationale for not analyzing these alternatives in detail is based primarily on the narrowly defined Purpose and Need:

> *The Purpose and Need is to incorporate management direction that conserves and promotes recovery of the Canada lynx, by reducing or eliminating adverse effects from land management activities on the amendment-area national forests and BLM lands, while preserving the overall multiple-use direction in existing plans.*

In deciding whether suggested alternatives met the Purpose and Need, the ID team (Interdisciplinary team) used information from the LCAS, BA, BO, the *Ecology & Conservation* and the Listing Decision. Suggested alternatives were then compared to the Proposed Action and the other action alternatives to see whether they represented a distinctly different approach but still met the Purpose and Need. Some people suggested that standards be dropped. These suggestions are reflected in Alternative A, the No Action alternative.

Based on this analysis, the following alternatives were not considered in detail.

1. Proposed action used in scoping

Some people were confused by parts of the scoping proposed action; others found it redundant and disorganized.

The scoping proposed action was rewritten to provide clearer management direction by organizing it better and eliminating duplication. The rewritten version is Alternative B, the Proposed Action described and evaluated in this DEIS. Since the scoping proposed action has been rewritten and since there is no difference in effects between it and Alternative B, it was dropped from further consideration.

Appendix A contains a crosswalk between the LCAS, the scoping proposed action and Alternative B, the DEIS Proposed Action.

2. Include a standard to limit type conversions

Forest management can result in changing the dominant vegetation from one species to another, called a "type conversion." Silvicultural prescriptions can be designed, for instance, to change the species composition from lodgepole pine to western larch, which would reduce winter snowshoe hare habitat. Some people said a standard should be considered to limit type conversions to tree species that are of less value to lynx.

On page 34, the BO discusses habitat conversions and identifies the conservation measures in the LCAS that relate to this concern. Alternative B, the Proposed Action, includes measures that

promote management toward historic conditions and restricts moving away from them.

The ID team reviewed the measures in Alternative B and decided another standard that restricts type conversions was not necessary because:

- Alternative B includes objectives that describe the desired condition of lynx habitat
- Vegetative management projects should be designed to meet or move toward meeting the objectives
- Such language was not included in the LCAS and no new information has been found.

3. Limit the size of clearcuts and other regeneration harvest units

Some people wanted an alternative to limit the size of clearcuts to 40 acres. They wanted regeneration timber harvest limited to irregularly shaped cutting units no more than 300 feet wide. They wanted a standard that would make sure lynx travel corridors would be wider than 330 feet and that cutting units would be designed to preserve travel corridors, especially along ridges, saddles and riparian areas.

Standards ALL S1 and VEG S2 and Objectives VEG O1 and VEG O4 indirectly respond to concerns about unit size and travel corridors. Openings created by even-aged harvest are normally 40 acres or less. Creating larger openings requires 60-day public review and Regional Forester approval, with some exceptions (R1 Supplement FSH (Forest Service Handbook) 2400-2001-2; R2 Supplement 2400-99-2).

In 1990, Koehler speculated that openings created by regeneration harvest, where the distance-to-cover was greater than 325 feet, might restrict lynx movement and use patterns until the forest re-grows.

While it is assumed lynx would prefer to travel where there is forested cover, the literature contains many examples of lynx crossing unforested openings (Roe et al. 2000).

Lynx evolved with disturbance. In the northern Rockies, the most common disturbance is fire. The LCAS and Alternative B recognize that fact.

Fires come in many sizes. Most are small. Generally, a few, very large fires burn most of the acres. Recent burns provide herbaceous summer foods; older burns provide woody winter browse (Fox 1978).

The LCAS says landscapes with trees of various heights that support dense understory vegetation may be more likely to support high snowshoe hare populations (Poole et al. 1996). Trees in a distribution of ages may provide a greater range of available browse as snow depths vary throughout the winter.

Larger openings can often more closely resemble vegetative patterns similar to natural disturbance events (e.g. fire, windthrow, and insect outbreaks) (USDI FWS, 2003). A disturbance pattern characterized by a few large blocks may be desirable if large areas of forested habitat are a management goal, or if the predation and competition that occur at the edges between vegetation types is a problem (Ruggiero et al. 2000a, p. 431).

While it's true that lynx may not use large openings initially, once they've re-grown and can provide cover, generally after ten to 30 years, such areas may be important to lynx (USDI FWS 2003, p. 40092).

Alternative B already contains direction to consider natural disturbances and maintain habitat connectivity. Based on the management direction in Alternative B and evaluating the information in the *Ecology & Conservation* and the LCAS, the ID team decided that a standard limiting the size of openings was unlikely to improve lynx conservation.

4. Drop Standard VEG S1 that allows no more than 30 percent unsuitable habitat or change the percentage

Some people said 30 percent was "one-size-fits-all" direction that doesn't take into account local conditions or natural disturbances. Others said allowing 30 percent unsuitable was no real improvement. People said the amendment should make a decision about whether 30 percent unsuitable (or any amount) was too high for lynx to recover, and whether stricter standards were needed.

Standard VEG S1 says that if more than 30 percent of an LAU is lynx habitat in unsuitable condition, vegetative management cannot make more unsuitable unless an assessment shows different historic levels there. If a broad-scale assessment is completed, the standard can be modified to take local conditions into account.

The standard tries to make sure blocks of quality lynx habitat are maintained in each LAU, to sustain a good distribution of lynx habitat at the scale of a lynx home range.

Unsuitable habitat will grow into foraging condition over time. Providing a distribution of forest ages is important, so large parts of each LAU are always winter snowshoe hare habitat.

Fire is the most common disturbance process in lynx habitat. Generally, large stand-replacing fires burn every 40-200 years and smaller low intensity fires burn in the intervals between the stand replacing fires (Fisher and Bradley 1987; Smith and Fisher 1997).

Based on this historic fire pattern, it's likely wildfires would often create more than 30 percent unsuitable habitat in an LAU in the northern Rockies.

An analysis of lynx habitat on NFS lands in northern Idaho and Montana showed that large wildfires generally burn more than 30 percent of an LAU (Hillis et al. 2003). This indicates the 30 percent standard may be too small or that the scale at which the standard is applied may be too small. Alternatives C, D and E address this issue by changing the scale of analysis.

5. Drop the ten percent denning standard or increase it

Some people said there was no basis for retaining ten percent denning habitat – they wanted the standard dropped altogether. Others wanted more denning habitat required.

Standard VEG S3 requires retaining ten percent denning habitat and deferring actions that change vegetation if there's less than ten percent.

Woody debris – piles of wind-thrown trees, root wads or large down trees – provides lynx denning sites. Large woody debris gives kittens an escape route from predators, as well as cover from the elements. During the first few months of life, when kittens are left alone while the mother hunts, denning habitat must be available throughout the home range (Bailey 1974). It's necessary for lynx survival.

Preliminary results of habitat research currently underway in Montana indicate denning sites can be found in both mature and younger forests that have dead and down trees, and that jack-strawed smaller logs are sometimes used as den sites (Squires pers. com). The integral component for all lynx den sites appears to be the amount of down, woody debris present, not the age of the forest stand (Mowat et al. 2000).

Retaining ten percent denning is based on a model to maintain lynx habitat over time (Brittel et al. 1989). The model recommended a balance of conditions – 30 percent forage, 30 percent unsuitable that will grow into forage, 30 percent travel and ten percent denning.

The BA and BO both said denning is not likely a limiting factor for lynx in the northern Rockies because most existing plans already include provisions to retain down woody debris and old growth. In fact, the BA said existing plans that require retaining well-distributed old growth would meet denning habitat needs (Hickenbottom et al. 1999, p. 147).

Some existing plans were found lacking – either they didn't require retaining old growth or they didn't require it to be well distributed (Hickenbottom et al. 1999, p. 69). Therefore, the ID team decided it was reasonable to include some direction in the amendment.

The ID team decided a standard requiring a different amount of denning habitat was not needed because scientific information has not shown more should be provided, and because it's not likely limiting anyway since it's found in wide variety of forest conditions.

6. Prohibit harvest in old growth or mature timber

Some people asked for an alternative to prohibit harvest in old growth or mature timber to protect denning habitat. Some people said that all old growth should be protected by the amendment because some administrative units don't meet old growth standards.

Standard VEG S3 says management actions that change vegetation should be deferred if there's less than ten percent denning habitat. Standard VEG S4 and Guideline VEG G2 also provide direction about denning habitat.

As previously noted, denning habitat is found in a variety of stand conditions and stand ages, not just old growth and mature timber. The BA and BO both said denning habitat is likely not a limiting factor for lynx in the northern Rockies (Hickenbottom et al. 1999, p.69; USDI FWS 2000a, p. 31-32), because most existing plans – except the Ashley, Bighorn and Deerlodge NFs – contain provisions deemed adequate to retain dead and down woody material or old growth.

Part of the Purpose and Need is to preserve the overall multiple-use direction in existing plans. Prohibiting the harvest of mature timber would substantially change that direction and not meet the Purpose and Need.

The ID team did not evaluate this alternative in detail because

- Alternative B defers actions where there's less than ten percent denning;
- Denning habitat is found in a variety of habitat conditions;
- Denning habitat does not appear to be a limiting factor; and
- Prohibiting timber harvest would not meet the Purpose and Need.

7. Drop the exemptions in Standard VEG S4 that allow salvage logging

Some people said allowing salvage logging in disturbed areas smaller than five acres lacked a scientific basis and that all salvage harvest should be deferred.

Standard VEG S4 says salvage harvest would be okay in disturbed areas smaller than five acres if they were:

- Developed recreation or administrative sites, or authorized special use improvements;
- Designated roads and trails where public safety or access has or may be compromised; or
- In LAUs where there's at least ten percent denning habitat that's been mapped and field validated.

This standard would retain small patches of dead and dying trees for denning sites. Removing small areas of dead and dying trees would be allowed if they were safety hazards or fuel buildups in and near developed areas. Salvage logging would also be allowed if ten percent denning already exists.

Denning habitat is not likely a limiting factor in the amendment area (Hickenbottom et al. 1999, p. 69; USDI FWS 2000a, p. 31-32).

The ID team retained the allowances since denning habitat is not likely limiting and because the agencies have a responsibility to make sure developed areas, roads and trails are safe from hazards.

8. Add standards and guidelines to direct when and where wildland fire should be allowed to burn

The BA found suppressing wildfire might limit its role in creating winter snowshoe hare habitat, thus contributing to the risk of adverse effects on lynx (Hickenbottom et al. 1999, p. 69-70). Some people said none of the standards addressed fire suppression. They said the analysis should recognize the vital role of natural fire, which should be allowed to burn when it occurs.

Alternative B encourages using fire where winter snowshoe hare habitat is limited. Objective VEG O3 says to conduct fire use activities to restore ecological processes and maintain or improve lynx habitat. Guideline VEG G1 says vegetation management near denning habitat should be planned to recruit and maintain winter snowshoe hare habitat where it's scarce, unavailable or declining.

Where fire suppression does occur in lynx habitat, it can reduce the quality of habitat by reducing the amount of young forests or by changing species composition and

structure of forests. (Ruediger et al. 2000, p. 2-6, USDA FWS 2003, p. 40094).

Many existing plans allow using wildland fire in *non-developmental allocations* – places where natural disturbance processes predominate, such as wilderness and roadless areas (Hickenbottom et al. 1999, p. 67). Most direct aggressive fire suppression in *developmental land allocations*, places where campgrounds and active management like timber sales are allowed (Hickenbottom et al. 1999, p. 69).

Changing plans to allow natural fires would require evaluating each area to see where, when and under what conditions natural fires should be allowed. This would expand the scope of the Purpose and Need, Proposed Action and alternatives.

The ID team decided that the decision about where to let natural fires burn would be best evaluated at the local level, so local conditions could be considered. The existing alternatives encourage using natural fire, but leaves the decision about when and where to the responsible local officials.

9. Prohibit grazing on federal lands, add more standards about grazing or drop them

Some people asked for an alternative that prohibits grazing in lynx habitat or one that incorporates stronger standards to reduce grazing impacts on hare forage and cover. Others said there's no evidence livestock grazing has a detrimental effect on hare forage or lynx.

Alternative B addresses the LCAS grazing risk factors in Standards GRAZ S1 through GRAZ S4. They provide management direction for livestock grazing that would retain winter snowshoe hare habitat, including aspen, willow, riparian areas and shrub-steppe. The Listing Decision did not identify grazing as a concern. The FWS Remand Notice found no information that grazing poses a threat to lynx (USDI FWS 2003, p 40083).

Since the LCAS risk factors were addressed in Alternative B, the ID team decided an alternative that prohibited grazing was not necessary. Prohibiting grazing also would not meet the Purpose and Need of maintaining the overall multiple-use direction in existing plans.

On pages 2-13 to 2-14, the LCAS discussed the potential effects of livestock grazing, noting that no studies had been done about dietary overlap between livestock and snowshoe hare or about the response of snowshoe hare to livestock grazing. The LCAS evaluated studies done on other species and the effects of grazing, and suggested livestock grazing may also affect lynx habitat.

After the ID team reviewed the literature, it found enough information to warrant some level of grazing direction. In Alternative E, the grazing standards are changed to less-restrictive guidelines because the FWS Remand Notice found no information that grazing poses a threat to lynx.

The ID team did not develop an alternative to drop grazing direction entirely because information indicates grazing may have local effects, although it may not affect the population as a whole. Alternative A does not include either

standards or guidelines for grazing to benefit lynx.

10. Remove all over-the-snow standards, let over-the-snow use increase, or further restrict or prohibit it

Some people said standards related to over-the-snow use should be removed. They said there's no evidence to show that coyotes and other predators use packed snow trails to compete with lynx for prey, and that amount of compaction created by snowmobiles is insignificant compared to the compaction created naturally by the weather. They were particularly concerned that if such language was introduced into plans, it could be difficult to change, incrementally restricting the places where snowmobiling is allowed.

Others wanted an allowance made to increase use.

Still others asked that no dispersed over-the-snow use be allowed off groomed or designated trails and areas, saying no net increase in groomed or designated routes didn't go far enough.

Alternative B contains Objectives HU O1 and HU O3 that discourage expanding snow-compacting human activities, and Standard HU S1 that would allow existing over-the-snow areas to continue but not grow. Alternative B would not change the travel maps that manage winter recreation by indicating which areas are open – areas open to over-the-snow travel would remain open. Alternative B also would allow existing special use permits and agreements to continue. It would not allow increases in the miles of designated over-the-snow routes in an LAU unless the increases serve to consolidate use and improve lynx habitat.

Snow conditions vary, both seasonally and from year to year. Periods of warm and windy weather, alternating with freezes, may result in hardened snow. How long crusted snow lasts depends on location, aspect, slope, and snowfall and temperature changes. Storms producing heavy snowfall are typical and frequent in the northern Rockies. Compacted snow may exist continuously only in places where repeated snow-compacting activities occur throughout the winter.

Lynx have very large feet in relation to their body mass, providing them a competitive advantage over other carnivores in deep snow. Various reports and observations have documented coyotes using high elevation, deep snow areas (Buskirk et al. 2000a). Coyotes use open areas because the snow is more compacted there, according to research conducted in central Alberta (Todd et al. 1981). In another study in Alberta, coyotes selected hard or shallow snow more often than lynx did (Murray et al. 1994). Related research is currently underway in northwestern Montana, northern Utah and north-central Washington – see Appendix F.

The Listing Decision stated that

> *... the variability of snow conditions and frequency of fresh snows in the winter habitats that support lynx, continually reduce or alter the availability of snow trails and shallow snow depths used by coyotes in lynx habitat, making it more difficult for*

coyotes to effectively hunt in these areas regularly during the winter.

The Biological Opinion stated that

Additional information needs on the interrelationships between lynx and other carnivores during deep snow periods, and the influence of compacted snow routes on interspecific competition are identified in the LCAS. While dietary overlap suggests the possibility of competition between coyotes and lynx (Staples 1995, O'Donoghue et al. 1998b), there are no data available that demonstrate that coyote competition is currently negatively affecting lynx populations. The LCAS would limit the expansion of winter dispersed recreation activities in lynx habitat until more conclusive information is available.

The FWS Remand Notice states,

Despite the lack of evidence that competition with any species is negatively affecting lynx, the final rule expanded the theory that ski and snowmobile trails and roads that are maintained for winter recreation and forest management create packed snow corridors that give other species, particularly coyotes, access to lynx winter habitat on all land ownerships. This theory has neither been proven or disproven at this time (Roe et al. 2001)...Because no evidence has been provided that packed snowtrails facilitate competition to a level that negatively affects lynx, we do not consider packed snowtrails to be a threat to lynx at this time.

An alternative to drop all direction limiting snow compaction was not developed in detail because there is evidence competing predators use packed trails, suggesting a potential effect on individual lynx. The ID team decided it was prudent to maintain the status quo and not let over-the-snow routes expand until more information becomes available, because it's possible that over time, unregulated expansion could impair future conservation efforts. However, the ID team also decided it was reasonable to change the direction from a standard to a less-restrictive guideline in one alternative, Alternative E.

There's also no basis to establish any particular threshold of allowable increases. However, alternative language has been developed that would allow expanding winter recreation in some places where heavy public use existed in 1998, 1999 or 2000. Such increases are addressed in Alternatives C, D and E.

An alternative to prohibit all snow-compacting activities or to limit dispersed use was evaluated, but not considered in detail because it's unknown whether competition negatively affects lynx populations (USDI FWS 2000a; USDI FWS 2000b, UDDI FWS 2003). Such an alternative would not meet the Purpose and Need to retain the multiple-use direction in existing plans. When research can provide more answers, this information can be addressed as plans are amended or revised in the future.

11. Include winter-logging road restrictions in the over-the-snow standard

Some people said winter logging has negatively affected lynx so it should be limited.

They said the alternatives should provide the flexibility to rule out winter logging in sensitive lynx habitat.

Alternative B doesn't specifically address winter logging. Winter logging is often used to reduce effects on soils or to other species like grizzly bears. Timber sale contracts identify which roads may be used for access.

Winter logging could affect lynx by providing access to competitors using plowed roads. Generally, such access takes place for just one or two seasons on a given route. Snowmobile use tends to be more consistent from year to year.

Effects of winter logging are even more speculative than for regularly compacted trails. The ID team decided that designing access to timber sales could take lynx needs into account and minimize effects, so there was no need to ban or otherwise specifically address winter logging.

12. Remove ski areas or don't let them expand

The lynx amendment would allow ski areas, an existing threat to lynx, to continue to exist. Some people said ski areas should be removed or at least prevented from expanding.

Alternative B includes management direction about ski area development, expansion and operations to provide for lynx movement, security and habitat needs in Objectives ALL O1, HU O2 and HU O4, Standards ALL S1 and HU S2 and Guidelines HU G1, HU G2 and HU G3.

The LCAS identified risk factors associated with ski areas, including *short-term effects* on denning, foraging and diurnal security habitat and *long-term effects* on movement in and between home ranges (Ruediger et al. 2000, p. 2-10). Ski areas may eliminate habitat and pose a threat to movements; most were constructed before lynx became a conservation issue (Hickenbottom et al. 1999, p. 70). Mitigation measures can be developed at the project level to lessen the effects of existing developments.

After consultation, the FWS concluded that some ski areas were not likely to adversely affect lynx while others may have adverse effects (USDA FS, USDI BLM 2000a). Nevertheless, the FWS concluded ski areas would not jeopardize the continued existence of lynx.

No further information has been provided to show Alternative B is insufficient to conserve lynx. Removing existing ski areas clearly would be contrary to existing plan direction. Any changes to individual sites should be evaluated site specifically.

Therefore, the ID team decided an alternative to remove existing ski areas or prevent them from expanding does not warrant detailed study. Alternative B does include direction on how new ski areas or expansions should consider lynx needs.

13. Ban road construction, provide more road-building restrictions, turn road-related guidelines into standards or drop the road-related guidelines

Some people said more restrictions on roads were needed to conserve lynx. They wanted new road construction halted, road densities identified and existing roads closed or eliminated, or they wanted the roads

guidelines turned into standards, which are more restrictive.

Other people said there should be no road-related standards or guidelines, saying no evidence exists that roads harm lynx. Some people said Guideline HU G9 should be deleted because there are no compelling reasons to close roads.

Alternative B contains management direction that would minimize snow compaction in new places in lynx habitat and provide habitat connectivity in Objectives ALL O1, HU O1 and HU O6, Standards HU S1, HU S3 and LINK S1, and Guidelines ALL G1, HU G4, HU G6, HU G7, HU G8 and HU G9.

Little information is available about the effects of roads and trails on lynx or its prey (Apps 2000; McKelvey et al. 2000d). Roads may reduce lynx habitat by removing forest cover. Along less-traveled roads where the vegetation provides good hare habitat, sometimes lynx use the roadbeds for travel and foraging (Koehler and Brittell 1990; Ruediger et al. 2000, p. 2-12).

Roads and trails facilitate human use during winter. Snow compaction on roads and trails may give competing carnivores winter access into lynx habitat (Buskirk et al. 2000a), a concern addressed in Standards HU S1 and HU S3.

Although many species of wildlife are disturbed when forest roads are used (Ruediger 1996), preliminary information suggests lynx do not avoid roads (Ruggiero et al. 2000a) except at high traffic volumes (Apps 2000). In denning habitat, when roads are used during summer, lynx may be affected if they move their kittens to avoid the disturbance (Ruggiero et al. 2000b; Ruediger et al. 2000, p. 2-12).

A recent analysis on the Okanogan NF in Washington showed lynx neither preferred nor avoided forest roads, and that the low road density in the study area did not appear to affect lynx habitat selection (McKelvey et al. 2000c; USDI FWS 2000a, p. 39). This analysis did not address potential indirect effects on habitat quality.

The ID team reviewed the LCAS and other literature, including the FWS Remand Notice, and found no information indicating road building should be banned or that further restrictions were needed. The standards and guidelines in Alternative B adequately address the known risks associated with roads or highways.

The ID team also evaluated whether the road-related guidelines should be made into standards. A standard amounts to a mandate unless the existing plan is amended. A guideline has to be considered, but if resource reasons can be documented, managers may depart from it.

Many internal commenters expressed concern that the roads guidelines would not let managers address watershed and safety concerns (see the Internal scoping comments in the Project Record). The ID team decided guidelines were the best way to provide direction about what should be considered for lynx. The flexibility provided by guidelines is

appropriate where the benefits to lynx are not very clear.

The ID team also evaluated whether an alternative should be developed that dropped all road-related guidelines. The available information indicates some direction is needed to make sure lynx needs are considered in road management decisions; therefore, an alternative to drop road-related direction was not considered in detail. The ID team did change the emphasis of Guideline HU G6 in Alternatives C, D and E, from prohibiting road upgrades to mitigating the effects.

14. Limit road densities

Some people asked for a standard limiting the density of roads.

The density of roads does not appear to affect lynx habitat selection. On page 2-12, the LCAS said there was no compelling evidence to suggest managing road densities was necessary to conserve lynx.

Alternative B contains Guideline HU 9, which says public use should be restricted on new roads. New roads are to be decommissioned after use if they aren't needed for other reasons.

The scoping proposed action included a guideline to prioritize reducing road densities in lynx habitat. This guideline was dropped from the DEIS Proposed Action, Alternative B, because in 2000, the Roads Analysis policy was adopted at 36 CFR 212.5(2). This new federal regulation says all FS road systems must be evaluated based on their environmental effects to see whether they should be kept or decommissioned. Therefore, the guideline is no longer needed.

The ID team decided not to consider a road density standard in detail because there's no compelling evidence it's needed. Guideline HU G9 provides direction on new roads, and the Roads Policy requires reviewing existing roads.

15. Prohibit logging in lynx travel corridors

Some people said logging should not be allowed in lynx travel corridors.

Studies of lynx and snowshoe hare have documented lynx presence and reproduction and snowshoe hare abundance in a variety of managed landscapes (USDI FWS 2003). While it is assumed lynx would prefer to travel where there is forested cover, the literature contains many examples of lynx crossing large, unforested openings (Roe et al. 2000).

In the northern Rockies, lynx habitat occurs at higher elevations and, therefore is naturally fragmented by topography into island-like patches (McKelvey et al. 2000b). Lynx cross intervening landscapes, made up of shrub-steppe, grassland, low-elevation forested or unforested valleys, and in some cases, desert, to reach these habitat islands (USDI FWS 2003).

Retaining vegetation to provide cover for lynx and habitat for prey is desirable. For those plans already amended by INFISH (Inland Native Fish Strategy) and PACFISH (Interim Strategy for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California), management direction exists to retain riparian habitat and provide for

connectivity (Hickenbottom et al. 1999, p.71).

Logging units can be designed to provide cover or movement corridors between blocks of lynx habitat. Alternative B and the other action alternatives include Standard ALL S1, which requires logging to maintain habitat connectivity.

The ID team evaluated this concern and determined that Alternative B already included a standard to maintain habitat connectivity. No compelling evidence has been presented to show logging in travel corridors effects lynx, so an alternative prohibiting it is not warranted.

16. Establish only objectives for lynx management, not standards

Some people would like all the proposed management direction to be objectives. They said standards should not be established because there's so little information about lynx.

Alternative B contains one goal and several objectives, standards and guidelines for lynx management. Objectives describe desired resource conditions. Standards are required management actions that tell resource managers how to achieve the objectives; standards can include requirements to refrain from taking action in some situations.

Lynx was listed by the FWS as a threatened species because of the lack of management direction in existing plans. The BA found existing plans were likely to adversely affect lynx because of the lack of management direction.

Adding more objectives would not answer this need because objectives only describe desired conditions. Standards provide greater assurance that the desired conditions will be met; they are better regulatory mechanisms. Standards describe what the limits are for activities and the sideboards for management.

The ID team evaluated this comment, and decided that establishing only objectives would not meet the Purpose and Need. Much of the reason the amendment is needed is that existing plans fail to reduce or eliminate the adverse effects of land management activities.

17. Apply lynx conservation measures to areas that have not been mapped as lynx habitat or apply them only to occupied lynx habitat

Some people wanted the proposed management direction to be applied to areas that have not identified as lynx habitat. Others asked that the direction apply only to occupied habitat, in places where the presence of lynx has been proven.

Alternative B would apply management direction to lynx habitat identified at the time a project is proposed – see Chapter 1.

The criteria for identifying lynx habitat were developed in the LCAS (pp. 4-8 to 4-11) based on snow conditions, vegetation types and the verified historical distribution of lynx as described in the *Ecology & Conservation* – see Appendix B.

To be considered lynx habitat, an area must be able to support the type and arrangement of vegetation that sustains enough snowshoe hares, and experience the deep snow winters where lynx have a

competitive advantage (USDI FWS 2003). Landscapes with these characteristics are considered capable of providing habitat components adequate for lynx to persist over time.

While lynx sometimes may occur in areas outside of lynx habitat, it's unlikely that those areas provide what lynx need to persist over time. No scientific basis has been offered for applying lynx conservation measures to habitats other than those described in the LCAS. There is no basis to conclude that applying the measures to other habitats would provide any additional benefits to lynx. Consequently, no alternatives have been developed to expand where amendment direction would be applied.

During project analysis, maps of lynx habitat will be reviewed and updated based on local information. In addition, ESA requires that adverse effects on lynx must be addressed whenever projects may affect them. Future plan amendments or revisions may also consider lynx and information about local lynx presence as appropriate. However, at this time and at the broad scale of this amendment, there's no basis for directing the conservation measures to apply to anything but the lynx habitat identified using the existing criteria.

The ID team also considered whether the management direction should apply only to occupied lynx habitat. The team considered that lynx are a wide-ranging animal, which may or may not occupy habitat at any given time. Therefore, the team decided the management direction should apply to all habitats that could support them. The team also considered that the conservation and recovery of lynx requires them to be able to survive in places where they are not currently found.

18. Develop stipulations for oil & gas, coal and geothermal leases

Some people said lease stipulations identifying constraints on developing oil & gas, coal or geothermal resources should be one of the decisions made as a part of this amendment.

The scoping proposed action contained a guideline that said stipulations should be developed at the leasing stage to limit the timing of activities and surface use and occupancy for actions proposed in lynx habitat. Alternative B, the Proposed Action, does not include similar language.

The main effects of leases and mines on lynx are probably related to the potential for plowed roads to provide access for lynx competitors, particularly coyotes (Ruediger et al. 2000). In the amendment area, about eight wells are predicted to be developed over the next ten years – see the *Minerals* section in Chapter 3.

To address the risk of providing access to competitors, Alternative B contains direction restricting mineral access to specific routes, encouraging remote monitoring and developing reclamation plans, and managing public access in Standard HU S3 and Guidelines HU G4, HU G5 and HU G9. This direction applies to areas already leased.

When an energy-related project is proposed on lands open for leasing, the lessee must obtain approval from the BLM and FS for any activities, even though the lessee has legal rights to develop. All

leases include a standard term that says before any disturbance may take place, surveys or studies may be needed to find the extent of impacts to threatened and endangered species and whether site-specific mitigation will be needed. Standard lease terms say drilling operations can be moved either in place – up to 200 meters – or in time – up to 60 days (43 CFR 3101.1-2).

An ID team would review the existing lease terms and the existing plan, as amended, to find if any further site-specific resource protection measures should be applied as conditions of approval for the surface-use plan of operations. The management direction in Alternative B would be applied as conditions of approval, where appropriate, for new drilling permits.

The lynx ID team decided no further lease stipulations were needed to provide for the conservation and recovery of lynx. The standard terms allow timing and location adjustments to be made where needed and Alternative B addresses the risk of providing access to competitors. Mineral activities are not widespread, are subject to laws and regulations and are not considered a threat to lynx populations as a whole (USDI FWS 2000a, USDI FWS 2003). Their effects are appropriately evaluated and mitigated at the project level. Therefore, the language in the scoping proposed action was dropped, and an alternative to specifically include lease stipulations was not considered in detail.

19. Move lynx into unoccupied habitat

Some people said the amendment should propose transplanting lynx into unoccupied habitat.

Transplanting is outside the scope of the Purpose and Need to manage habitat to conserve lynx; therefore, this comment was not considered in further detail.

20. Restrict hare hunting

Some people said the amendment should restricting hare hunting.

The states regulate hunting. Regulating hunting is outside the authority of the FS and BLM, which are both federal land management agencies. Therefore, the ID team did not consider this comment in further detail.

21. Include all the recommendations in the LCAS

People said some requirements in the LCAS were missing from the scoping proposed action.

The ID team reformatted the LCAS to match the format of land use plans. Some conservation measures were not included because they were instructions about how to map lynx habitat, descriptions of an analysis process or were already required in existing direction. Appendix A is a crosswalk between the LCAS, the scoping proposed action and Alternative B, the DEIS Proposed Action, showing what conservation measures ended up in Alternative B and what happened to measures not included.

Resource topics

People were concerned about the effects of Alternative B on:

- Other wildlife
- Range management
- Recreation
- Developing and exploring for minerals
- Economic well-being
- Social concerns
- Multiple use
- Consistency with other plans

The effects on these resource topics are addressed in Chapter 3, but did not lead to developing other alternatives.

Other concerns

People asked other questions that were not about the effects of the management direction in Alternative B.

Why was lynx listed as a threatened species?

The Listing Decision is not the responsibility of the FS or the BLM. FWS is the agency responsible for listing decisions, which are made based on several criteria included in the ESA. On March 24, 2000, the FWS decided lynx should be listed as a threatened species because of the lack of guidance to conserve lynx in existing National Forest Land and Resource Plans and BLM Land Use Plans (USDI FWS 2000b).

Once a species is listed under ESA, federal land management agencies like FS and BLM are responsible to make sure their actions are not likely to jeopardize the continued existence of that species, or to result in destroying or unfavorably changing its habitat. They are required to conserve the species, to take steps to eliminate or reduce the risk factors that led to the species being listed.

What is the scientific basis for the Proposed Action?

The Proposed Action, Alternative B, is based on the conservation recommendations identified in the LCAS. A team of biologists from FS, BLM, FWS and the National Park Service developed the LCAS. They evaluated the scientific information available about lynx and its prey and the habitat needs of both.

In the LCAS, literature was cited to support management recommendations. For many issues, little information existed. In these cases, assumptions or inferences were made based on the collective experience and professional judgment of the team members in consultation with other lynx experts. The rationale was documented in these situations.

Most lynx research has been conducted in Alaska and Canada, with few studies completed in the contiguous United States, which contains the southern portion of lynx range. Most research has focused on demographics and ecology, with little emphasis on management except for regulating trapping quotas.

At the time the LCAS was being developed, another team of scientists was preparing an assessment of the scientific basis for lynx conservation. They published the *Ecology & Conservation* in the year 2000. Their findings were integrated into the LCAS.

Chapter 8 of the LCAS identifies what research is needed, where little is known about the effects on lynx and its prey of such human-driven actions as precommercial thinning, snow compaction, highways, forest road densities, human developments, livestock grazing, etc. Several ongoing research efforts address these topics – see Appendix F. Research is underway in southern British Columbia, Montana, Wyoming, Washington and Maine that could lead to further insights for lynx management.

The ID team reviewed the LCAS, the *Ecology & Conservation*, the BA, the BO, the Listing Decision and other information currently available.

Why isn't more being done than what was included in the Proposed Action? How do you know the Proposed Action will be enough?

Some people proposed prohibiting timber harvest in old-growth or mature stands, prohibiting grazing, further restricting or prohibiting all over-the-snow activities and removing roads in lynx habitat. These suggestions were discussed in *Management considerations dismissed*, under item numbers 6, 9, 10 and 13.

The LCAS recommendations were designed to conserve lynx, and were based on the best scientific information available. The primary source of this information, the *Ecology & Conservation*, was peer-reviewed scientific literature.

The LCAS recommendations were designed to retain future management options, a conservative approach, intended to avoid irrevocable commitments of resources that might ultimately prove to be crucial to lynx. The LCAS biology team determined that if the recommended measures were implemented, they would conserve lynx (Ruediger et al. 2000, p. 7-1).

In addition, on page 58, the BO from the FWS said,

> *The direction provided by the conservation measures would assist Federal agencies in avoiding negative impacts on lynx. Based on the best scientific and commercial information currently available, we believe that Plans that incorporate the conservation measures, and projects that implement them, are generally not expected to have adverse impacts on lynx. Implementation of the measures in the LCAS across the range of lynx is expected to lead to the conservation of the species.*

Alternative B would incorporate essentially all the recommended conservation measures in the LCAS – see Appendix A, the crosswalk between the LCAS, the scoping proposed action and Alternative B, the DEIS Proposed Action. The ID team determined the effects of Alternative B would be the same as those resulting from the LCAS. The proposed amendment would contribute to conserving lynx by adequately addressing

the deficiencies in existing plans that were the basis for listing lynx as threatened.

Except for the issue about the effects of management activities on winter snowshoe hare habitat in multistoried forests, the comments have identified no new information that suggests effects on lynx would be greater than anticipated or warrant revisiting its adequacy.

Based on the ID team's review, there's no reason to consider conservation measures beyond those recommended in the LCAS because including them would show no additional benefits for lynx. Further, most of the comments would not meet the Purpose and Need of conserving lynx while maintaining the multiple-use objectives in existing plans.

Once the proposed amendment is in place, individual plans may be amended or revised as needed to respond to local conditions. Seventeen of the 18 national forests affected by this amendment will be revising their plans in the next few years, and the BLM anticipates its out-of-date plans will be redone in the next few years.

As noted, more research is needed and is underway. If new information suggests different management direction is required to conserve and recover lynx, then plans would be reviewed. Subsequent planning, including ongoing and scheduled revisions, may address lynx needs where there's a need to respond to information on an individual administrative unit.

Why was just one amendment proposed for a four-state area?

The FS and BLM both believe that whenever practical, management direction should be developed at the local level. In this case, developing direction locally was not practical because new information affecting many plans needed to be addressed promptly and consistently. Even though the amendment covers a large area, its scope was narrowly defined.

Why was the proposal limited to 18 national forests and the BLM in Idaho and northern Utah, instead of all the administrative units in the northern Rockies geographic area? Won't this result in inconsistent management?

Eleven units in the geographic area are addressing new information about lynx in separate planning processes, which include lynx but are broader in scope – see Chapter 1.

To make sure the management direction for lynx would be as consistent as possible across the range of lynx, the ID team is coordinating with these units. Even so, it's likely planning for individual units will result in different decisions because of differing habitat conditions, historic management, the amount and kind of information available and the ways direction would be integrated with other needs in these plans.

How does the National Lynx Survey affect this amendment?

The National Lynx Survey is a systematic national study being conducted to

evaluate where lynx are distributed and to help refine how lynx habitat is defined. When the survey detects a lynx, snow-tracking surveys and sometimes radio-telemetry studies follow, since detection could mean only that an individual passed through the area.

The results of the survey will increase our knowledge about the current distribution and use of lynx habitat. The results are not expected to directly affect this amendment, which relies on information about historic lynx habitat. If the results are published before a decision is made, that information will be considered.

How does the fact that hybrid lynx were found in Minnesota affect this amendment?

In 2003, FS scientists used DNA analysis to discover the first scientific evidence of hybridization in the wild between Canada lynx and bobcats.

Because of these findings, the FS conducted a DNA analysis of most of the lynx hair samples collection under the National Lynx Survey to see if hybridization had occurred elsewhere. So far, no additional instances have been detected.

There is no evidence of hybridization in the amendment area, so this issue will not be addressed further in this amendment.

Why aren't trapping and shooting addressed in the Proposed Action?

These activities are outside the jurisdiction of the FS and BLM, which are federal land management agencies.

The states regulate trapping and shooting. Trapping for lynx is not allowed in Montana, Idaho, Wyoming, Utah or Washington. Occasionally, lynx are incidentally captured during the trapping seasons for bobcat and wolverine, mostly in Idaho, Montana and Wyoming.

Why isn't predator control addressed in the Proposed Action?

On federal lands, the USDA Wildlife Service is responsible for predator control. Predator control activities are outside the jurisdiction of the FS and BLM. There's less predator control going on than historically, it's aimed at target species and it generally takes place outside lynx habitat, in lower elevation rangelands (Ruediger et al. 2000, p. 4-12).

Since the ban on poisons such as 1080, predator control on federal lands likely has a low potential to affect lynx (Ruediger et al. 2000, p. 4-12). Predator control on private lands is not as closely controlled as that on federal lands, but generally occurs outside lynx habitat.

Comparing alternatives

Table 2-2. Comparing how the alternatives address the issues

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Issue: Effect on over-the-snow winter recreation				
Ability to expand groomed routes				
Grooming could expand under direction in existing plans • Grooming levels were stable during the 1990s & are not likely to increase during the next 5 years due to increased costs of machinery & operations, & no increases in funding from states	Grooming could expand on about 3,500 miles of designated ungroomed routes, except additional grooming limited • On designated ungroomed routes on the Flathead, Gallatin, Targhee & Ashley NF & the Upper Columbia/Salmon BLM unit, because most designated routes are currently groomed	Grooming could expand • On about 3,500 miles of designated ungroomed routes • In areas of consistent snow compaction	Same as Alternative C	Same as Alternative C
Ability to expand designated routes				
• Designated ungroomed routes could expand based on existing plan direction • For outfitter-guide permits, changes in season of use are possible, but there's little ability to expand because of permitting process	• New designated routes would not be allowed above what exists today • For outfitter-guide permits, changes in season of use would be limited • For outfitter-guide permits, little ability to expand would be found anyway because of permitting process	• New designated routes would be allowed in areas of consistent snow compaction • For outfitter-guide permits, changes in season of use would be possible in areas of consistent snow compaction, but there's little ability to expand because of permitting process	Same as Alternative C	Same as Alternative C

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Effect on over-the-snow recreation				
No change in over-the-snow winter recreation	• Present opportunities would continue to exist • In the few units where grooming cannot expand, user experience may change • Outfitters could not expand winter operations into new areas	• Present opportunities would continue to exist • All units would be able to provide more groomed routes & opportunities, so user experience should not change • Outfitters could expand services into some new areas	Same as Alternative C	Same as Alternative C

Comparing how the alternatives address the issue

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Issue: Effects on wildland fire risk to communities				
Limits imposed on fuel treatments that reduce winter snowshoe hare habitat				
Direction in existing plans	Precommercial thinning allowed only • Within 200 feet of structures	Fuel treatment projects allowed only • Within 200 feet of structures	Fuel treatment projects allowed only • Within 200 feet of structures • When a broad scale assessment finds different historic forage levels • To maintain or improve foraging habitat in the long term	Direction in existing plans
Ability to conduct fuel treatments **outside** winter snowshoe hare habitat				
Direction in existing plans	Standards VEG S1 through VEG S4 could limit fuel treatment in some circumstances – most projects could be designed to meet the standards			Direction in existing plans
Percent of fuel treatment program **inside** the WUI that may need to be relocated during next decade due Standards VEG S5 & VEG S6				
None	• 5% in high density forests • 4% in low density forests	• 10% in high density forests • 9% in low density forests	• Less than Alternative C • Less than Alternative C	None
Percent of fuel treatment program **outside** the WUI that may need to be relocated during next decade due Standards VEG S5 & VEG S6				
None	• 8% in high density forests • 7% in low density forests	• 17% in high density forests • 13% in low density forests	• Less than Alternative C • Less than Alternative C	None
Effect on wildland fire risk				
No change	• Constrains only fuel treatments that use precommercial thinning • Could displace 6-11% of the fuel treatment program • May limit ability to reduce fire size and intensity in some places	• Constrains fuel treatments • Could displace 12-22% of the fuel treatment program • Likely to limit ability to reduce fire size and intensity in some places	• Constrains fuel treatments • Could displace 12-22% of the fuel treatment program • Likely to limit ability to reduce fire size and intensity in some places	• Would not constrain fuel treatment • Would not limit ability to reduce fire size and intensity

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Issue: Effects on maintaining winter snowshoe hare habitat in multistoried forests				
Activities **allowed** in lynx foraging habitat in multistoried forests outside wilderness				
Direction in existing plans	Vegetation management projects other than precommercial thinning • But precommercial thinning permitted within 200 feet of structures	Only vegetation management projects • Within 200 feet of structures or for research	Only vegetation management projects • Within 200 feet of structures or for research • To restore planted white pine, western larch, ponderosa pine & whitebark pine where 80% of the forage habitat is retained • To restore whitebark pine • To develop future old growth lodgepole pine • When a broad scale assessment finds different historic forage levels • To maintain or improve foraging habitat in the long term	Vegetation management projects • To maintain or improve foraging habitat in the long term • Where there is rationale to deviate from the guideline
Effect on winter snowshoe hare habitat in multistoried forests outside wilderness				
May be reduced by 4-5%	May be reduced by 3-4%	No reduction, forage habitat maintained	May be reduced by 2-3%, plus some habitat improved.	May be reduced by 4-5% plus some habitat improved

Comparing how the alternatives address the issue

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Issue: Effect on the ability to restore tree species and forest structures in decline				
Ability to precommercially thin young regenerating forests to maintain or restore tree species in decline				
Direction in existing plans	Only when stands no longer provide foraging habitat, or • Within 200 feet of structures	Same as Alternative B, plus • Research & genetic tests	Same as Alternative C, plus • Daylight thinning around planted white pine, western larch & ponderosa pine retaining 80% of forage habitat • Restoring whitebark pine & aspen • Thinning lodgepole pine to promote future old growth • When a broad scale assessment finds different historic forage levels	Same as Alternative C, plus • Fuel treatments developed through a collaborative process

How much precommercial thinning could be done

Reason for precommercial thinning	Alternative A Outside lynx habitat	Alternative B Inside lynx habitat	Alternative C Inside lynx habitat	Alternative D Inside lynx habitat	Alternative D Inside lynx habitat	Alternative E Inside lynx habitat
Research	80 acres	1,450 acres	0	1,450 acres	1,450 acres	1,450 acres
Genetic tests	320 acres	220 acres	0	220 acres	220 acres	220 acres
Within 200 feet of dwellings	4,170 acres	2,190 acres	2,190 acres	2,190 acres	2,190 acres	2,190 acres
Restoration †	123,080 acres	232,620 acres	0	0	232,210 acres	0
Western white pine	*19,610 acres*	*51,090 acres*	*0*	*0*	*51,090 acres*	*0*
Whitebark pine	*250 acres*	*9,110 acres*	*0*	*0*	*9,110 acres*	*0*
Aspen	*3,070 acres*	*3,050 acres*	*0*	*0*	*3,050 acres*	*0*
Ponderosa pine	*48,450 acres*	*11,660 acres*	*0*	*0*	*11,660 acres*	*0*
Larch	*45,280 acres*	*123,160 acres*	*0*	*0*	*123,160 acres*	*0*
Lodgepole	*6,420 acres*	*34,550 acres*	*0*	*0*	*34,550 acres*	*0*
Other	57,170 acres	159,660 acres	0	0	0	0
Total thinning ‡	184,820 acres	396,140 acres	2,190 acres	3,860 acres	236,480 acres	3,860 acres

† Restoration = western white pine + whitebark pine + aspen + ponderosa pine + larch + lodgepole

‡ Total thinning = research + genetics + within 200' of dwellings + restoration + other over ten years

Acres shown are total thinning-program request – it's likely historic average funding would be received to do only about 30% of what's requested

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Precommercial thinning deferred by amendment during next decade, based on historic average funding of about 34% of what's requested				
No deferral	132,000 acres	Same as Alternative B	56,000 acres	Same as Alternative B
Effect on tree species in decline				
• Data collected for research & tree improvement • Contributes to improving conditions for whitebark pine & aspen • Contributes to improving conditions for western white pine, western larch, ponderosa pine & old growth lodgepole	• No data collected for research & tree improvement • Contributes to continued decline of western white pine, whitebark pine, aspen, western larch & ponderosa pine • Contributes to decrease in old growth lodgepole pine	Same as Alternative B, only • Data is collected for research & tree improvement	• Data collected for research & tree improvement • Contributes to improving conditions for whitebark pine & aspen • Contributes to improving conditions for western white pine, western larch, ponderosa pine & old growth lodgepole	Same as Alternative C, except • May contribute to improving conditions for whitebark pine and aspen if they are treated to restore fire-adapted ecosystems

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Issue: What level of management direction should be applied to activities that the FWS remand notice found were not a threat to lynx populations?				
Nature of management direction applied to grazing, minerals, roads & over-the-snow recreation				
None	• Grazing Objective GRAZ 01 Standards GRAZ S1 - GRAZ S4 Standard LINK S2	Same as Alternative B	Same as Alternative B	Objective GRAZ 01 Guidelines GRAZ G1 - G4 Guideline LINK G2
None	• Minerals Objective HU 05 Standard HU S3 Guidelines HU G4 & HU G5	Same as Alternative B	Same as Alternative B	Objective HU 05 Guidelines HU G4, HU G5 & HU G12
None	• Roads Guidelines HU G6 - HU G9	Same as Alternative B	Same as Alternative B	Same as Alternative B
None	• Over-the-snow recreation Objective HU 01 Standards HU S1 & HU S3	Same as Alternative B	Same as Alternative B	Objective HU 01 Guidelines HU G11 & HU G12

Table 2-3. Comparing how management concerns are addressed in the alternatives

Alternative B	Alternative C	Alternative D	Alternative E
Management concern: Size of area to which Standard VEG S1 is applied – Standard VEG S1 limits the amount of unsuitable habitat to 30%			
Applies to an LAU, about 16,000 to 25,000 acres – this size makes it difficult to consider natural disturbance processes because they often involve larger areas	Applies to multiple contiguous LAUs – more closely resembles the scale of many natural disturbances	Applies to sub-basin or isolated mountain range, about 500,000 to one million acres – this size about the scale of many natural disturbances	Same as Alternative C
Management concern: Standards that focus on particular methods, such as timber harvest & salvage logging			
Standards VEG S2, VEG S4, VEG S5 & VEG S6	Standard VEG S4	None of the standards	None of the standards
Management concern: Guidelines that focus on methods such as timber harvest & salvage logging			
None	Guideline VEG G6	Guideline VEG G7	Same as Alternative D
Management concern: How denning habitat is considered			
If less than 10% denning habitat, then • Defer projects in potential denning habitat	Same as Alternative B	If less than 10% denning habitat, then • Defer projects in potential denning habitat, or • Leave enough standing trees & coarse woody debris to provide den sites	Same as Alternative D, only • Fuel treatments don't have to meet 10% denning standard
Management concern: Size of area for Standard HUS1 over-the-snow routes			
LAU this size makes it difficult to consider entire routes because they often involve larger areas	By LAU, or a combination of immediately adjacent LAUs	Same as Alternative C	Same as Alternative C
Management concern: How lynx diurnal habitat is considered			
Standard	Guideline	Same as Alternative C	Same as Alternative C
Management concern: How upgrading roads is considered			
Guideline to avoid upgrading or paving roads	Guideline to avoid or reduce effects on lynx when upgrading or paving roads	Same as Alternative C	Same as Alternative C

Alternative B	Alternative C	Alternative D	Alternative E
Management concern: How adaptive management is incorporated			
The 30% unsuitable habitat limit in Standard VEG S1 could be changed based on a broad scale assessment	Same as Alternative B	Same as Alternative B, plus • Standards VEG S5 and VEG S6 would allow precommercial thinning if a broad scale assessment finds different historic forage levels • Standard ALL S2 would allow projects to proceed if they have no adverse effects on lynx	Same as Alternative B, plus • Standard ALL S2 would allow projects to proceed if they have no adverse effects on lynx, or projects that may adversely affect lynx in the short term but have beneficial effects in the long term

Table 2-4. Comparing how the LCAS risk factors are addressed in the Alternatives

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
LCAS risk factor: Amount of lynx habitat in unsuitable condition				
Most FS & BLM plans contain limited or no direction	• Standard VEG S1 limits unsuitable habitat to 30% per LAU unless a broad scale assessment finds different historic levels • Standard VEG S2 limits how much unsuitable habitat can be created by timber harvest to 15% of an LAU over a 10-year period • Standard ALL S1 requires vegetation management projects to maintain connectivity • Guideline VEG G1 encourages creating foraging habitat where it's lacking	• Standard VEG S1 limits unsuitable habitat to 30% per combination of adjacent LAUs unless a broad scale assessment finds different historic levels • Standard VEG S2 changes to Guideline VEG G6 • Changes Guideline VEG G1 to identify forest conditions to target for creating forage habitat	• Standard VEG S1 limits unsuitable habitat to 30% per sub-basin or isolated mountain range unless a broad scale assessment finds different historic levels • Drops Standard VEG S2, so no restrictions on how much unsuitable habitat can be created by timber harvest • Guideline VEG G1 same as Alternative C	Same as Alternative C, only • Standard VEG S1 would not apply to fuel treatment • Standard VEG S2 dropped, same as Alternative D
LCAS risk factor: Denning habitat				
• Most plans contain some direction for keeping dead & down material • Management direction inadequate or lacking in three FS & most BLM plans	• Standard VEG S3 requires retaining 10% denning habitat; if less, projects in potential denning habitat deferred • Standard VEG S4 prohibits salvage after a disturbance kills trees in patches smaller than five acres; unless there is 10% denning habitat, or in developed recreation sites, administrative sites or authorized special use structures or improvements; or in designated road or trail corridors where public safety or access may be compromised • Guideline VEG G2 encourages creating denning habitat where it's lacking • Guideline VEG G3 says to restore or retain denning habitat where it's less likely to burned by wildfire	Same as Alternative B, plus • Standard VEG S4 allows salvage logging within 200 feet of structures, dwellings or outbuildings	Standard VEG S3 same as Alternative B, only • Allows projects to move towards 10% denning habitat by leaving standing trees & coarse woody debris – Guideline VEG G2 incorporated • Standard VEG S4 changed to Guideline VEG G7, so consider no salvage harvest in patches smaller than five acres if less than 10% denning per LAU	Same as Alternative D, only • Standard VEG S3 does not apply to fuel treatment

Comparing how the LCAS risk factors are addressed in the alternative

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
LCAS risk factor: Lynx foraging habitat (winter snowshoe hare habitat)				
Most FS & BLM plans contain limited or no direction, except for old growth in multistoried stages • Could reduce high density forage by 14% • Could reduce total forage by 9%	Standards VEG S5 & VEG S6 defer precommercial thinning in foraging habitat Other treatments: • Could reduce high density forage by 3% • Could reduce total forage by 2%	Standards VEG S5 & VEG S6 defer all vegetation management in foraging habitat, but allows • Research • Within 200 feet of structures • Could reduce high density forage by less than 1% • Could reduce total forage by less than 1%	Standards VEG S5 & VEG S6 defers vegetation management in foraging habitat, but allows • Research • Within 200 feet of structures • Restoring western larch, ponderosa pine & planted western white pine, where 80% of the forage is retained • Whitebark pine restoration • Promoting lodgepole pine old growth • When a broad scale assessment has found forage exceeds its historic availability • Aspen restoration in stand initiation stage • Improving or maintaining long-term foraging habitat in multistoried stages • Could reduce high density forage by 8% • Could reduce total forage by 4%	Same as Alternative B, only • Standard VEG S5 would not apply to fuel treatments or research • Standard VEG S6 changed to less-restrictive Guideline VEG G8 • Could reduce high density forage by 5% • Could reduce total forage by 4%

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
LCAS risk factor: Wildland fire management				
Most FS & BLM plans contain limited or no direction	• Objective VEG O3 says to conduct fire use activities to restore ecological processes & maintain or improve lynx habitat • Vegetation standards would not require suppressing fires or apply to wildland fire use • Guideline VEG G4 says permanent travel routes should avoid facilitating snow compaction, and permanent firebreaks should avoid ridges or saddles	Same as Alternative B	Same as Alternative B	Same as Alternative B
LCAS risk factor: Winter recreation				
Most FS & BLM plans contain limited or no direction	• Standard HU S1 says no net-increase allowed in groomed or designated over-the-snow routes per LAU unless consolidating use or improving lynx habitat • Standard HU S2 says when developing or expanding ski areas, locate routes & access roads to maintain & provide lynx diurnal security habitat • Standard HU S3 restricts over-the-snow access for non-recreation special uses, timber sales, etc., to designated routes • Standard ALL S1 says new or expanded developments must maintain habitat connectivity • Includes Guidelines HU G1, HU G2 & HU G3 that require considering lynx habitat & movement needs	Same as Alternative B, however • Standard HU S1 says no net-increase in groomed or designated over-the-snow routes allowed per combination of adjacent LAUs, unless consolidating use, improving lynx habitat or in areas of consistent snow compaction • Standard HU S2 changed to less-restrictive Guideline HU G10	Same as Alternative C	Similar to Alternative C • Standard HU S1 changed to less-restrictive Guideline HU G11, which says use should not expand • Standard HU S3 changed to less-restrictive Guideline HU G12

Comparing how the LCAS risk factors are addressed in the alternative

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
LCAS risk factor: Highways				
Most FS & BLM plans contain limited or no direction	• Standard LINK S1 says within linkage areas, potential highway crossings must be identified when construction or reconstruction is proposed • Guideline ALL G1 encourages avoiding or reducing effects on lynx when constructing or reconstructing highways and forest highways	Same as Alternative B	Same as Alternative B	Same as Alternative B
LCAS risk factor: Forest & backcountry roads				
Some FS & BLM plans contain direction which may conserve lynx, but others contain little or no direction	• Guideline HU G6 discourages upgrading & paving roads in lynx habitat where increases in human activity would result • Guideline HU G7 discourages building permanent roads on ridge-tops & saddles • Guideline HU G8 discourages cutting brush along low-speed, low-traffic roads • Guideline HU G9 encourages restricting public motorized use on new roads built to access projects & decommissioning new roads not needed for other reasons	Same as Alternative B, only • Guideline HU G6 encourages avoiding or reducing effects on lynx when upgrading & paving roads in lynx habitat where increases in human activity would result	Same as Alternative C	Same as Alternative C

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
LCAS risk factor: Livestock grazing				
Some existing direction (INFISH, PACFISH) partially meets lynx conservation needs in most plans	• Standard GRAZ S1 says grazing shall be managed to allow shrubs & trees to regenerate in fire- & harvest-created openings • Standard GRAZ S2 says grazing shall be managed to ensure aspen propagation • Standards GRAZ S3, GRAZ S4 & LINK S2 says grazing shall be managed to achieve seral stage distribution similar to historic patterns in wet areas, willows & shrub-steppe habitats	Same as Alternative B	Same as Alternative B	Changes standards to guidelines, changing the requirements from imperative "shall" to less-restrictive "should"
LCAS risk factor: Oil & gas leasing				
Most FS & BLM plans contain limited or no direction	• Standard HU S3 says motorized over-the-snow access for mineral & energy exploration & facilities shall be restricted to designated routes • Guideline HU G4 encourages remote monitoring • Guideline HU G5 encourages developing reclamation plans that improves lynx habitat	Same as Alternative B	Same as Alternative B	Similar to Alternative B, only • Changes Standard HU S3 to Guideline HU G12, changing the requirement from imperative "shall" to less-restrictive "should"
LCAS risk factor: Land ownership patterns				
Most FS & BLM plans contain limited or no direction	• Guideline LINK G1 encourages retaining FS & BLM lands in public ownership	Same as Alternative B	Same as Alternative B	Same as Alternative B

Comparing how the LCAS risk factors are addressed in the alternatives

Table 2-5. Comparing how the alternatives affect lynx

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Effects on lynx: Effects of amendment (change in effects from Alternative A)				
Individuals No change *Populations* No change	*Individuals* Beneficial effects; all risk factors fully addressed. *Populations* Beneficial effects; all risk factors fully addressed.	*Individuals* Beneficial effects; all risk factors substantially addressed. *Populations* Long-term beneficial effects; all risk factors substantially addressed.	*Individuals* Some beneficial effects; some risk factors related to denning and foraging habitat only partially addressed. *Populations* Some beneficial effects; some risk factors related to denning and foraging habitat only partially addressed.	*Individuals* Some beneficial effects; some risk factors related to denning and foraging habitat only partially addressed. *Populations* Some beneficial effects; some risk factors related to denning habitat only partially addressed.
Effects on lynx: Effects of plans as amended				
Individuals Adverse effects will continue. *Populations* Adverse effects will continue.	*Individuals* Beneficial effects; all risk factors fully addressed. *Populations* Beneficial effects; all risk factors fully addressed.	*Individuals* Beneficial effects; all risk factors substantially addressed. *Populations* Beneficial effects; all risk factors substantially addressed.	*Individuals* Some beneficial effects; may be some adverse effects over the short term; some risk factors related to denning and foraging habitat only partially addressed. *Populations* Some beneficial effects; may be some adverse effects over the short term; some risk factors related to denning and foraging habitat only partially addressed.	*Individuals* Some beneficial effects; may be some adverse effects over the short or long term; some risk factors related to denning and foraging habitat only partially addressed. Allowing fuel treatment projects may result in adverse effects. *Populations* Some beneficial effects; may be some adverse effects over the short or long term; some risk factors related to denning and foraging habitat only partially addressed. Allowing fuel treatment projects may result in adverse effects.

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Effects on lynx: Contributes to conserving species				
No	Yes	Yes	Partially Many standards contribute to conserving lynx but thinning allowances may result in adverse effects	Partially Many standards contribute to conserving lynx but vegetation standards that allow fuel treatment may result in adverse effects

Comparing how the alternatives affect lynx

Table 2-6. Comparing how the alternatives affect other resources

Alternative B	Alternative C	Alternative D	Alternative E
Effects on threatened, endangered and proposed species other than lynx			
All alternatives result in both limited reduction and improvement in habitat and are not likely to adversely affect listed or proposed species. Species include: mammals including grey wolf, grizzly bear and woodland caribou; birds including Mexican spotted owl; fish including bull trout, Chinook salmon, steelhead trout, bonytail chub, Colorado squaw fish, humpback chub, Kendall Warm Springs dace, razorback sucker, sockeye salmon, white sturgeon.			
Effects on sensitive species			
• All alternatives result in limited improvement in habitat for mammals including dwarf shrew and wolverine; birds including black-backed woodpecker, red-naped sapsucker, three-toed woodpecker, Williamson's sapsucker and white-headed woodpecker; and amphibians including boreal toad and northern leopard frog. • All alternatives result in both limited reduction and improvement in habitat and are not likely to adversely any sensitive species. Species include: mammals including fisher and marten; birds including boreal owl, great grey owl, merlin, northern goshawk, olive-sided flycatcher, and Swainson's thrush; fish including artic grayling, Colorado River cutthroat trout, interior redband trout, ling, sicklefin chub, Snake River cutthroat trout, sturgeon chub, torrent sculpin, westslope cutthroat trout and Yellowstone cutthroat trout. • All alternatives may cause limited reduction in habitat for two bird species Golden-crowned kinglet and Hammond's flycatcher. The alternatives are not likely to adversely affect these species.			
Effects on management indicator species			
• All alternatives result in limited improvement in habitat for mammals including beaver, bobcat and moose; birds including blue grouse, downy woodpecker, hairy woodpecker, northern flicker, red-breasted nuthatch, ruby-crowned kinglet; three-toed woodpecker, yellow bellied sapsucker, yellow warbler • All alternatives result in both limited reduction and improvement in habitat and are not likely to adversely any species. Species include: mammals including black bear, elk, red squirrel, mule deer and white-tailed deer; birds including pileated woodpecker; fish including Bonneville cutthroat trout, brook trout, cutthroat trout, large mouth bass, rainbow trout, sculpin, trout; and macro-invertebrates			
Effects on fish & aquatics			
Negligible effect	Same as Alternative B	Same as Alternative B	Same as Alternative B
Effects on plants – threatened, endangered, proposed and sensitive species			
Beneficial or no effect to all species	Same as Alternative B	Same as Alternative B	Same as Alternative B

Alternative B	Alternative C	Alternative D	Alternative E
Effects on timber management			
• May reduce opportunities for regeneration harvest where there are large areas of unsuitable habitat – about 13% of the LAUs exceed the 15% timber & 30% disturbance standards • Could increase opportunities for regeneration harvest where foraging habitat is lacking • Some projects may have to be deferred or locations changed where denning habitat is lacking, but denning habitat generally is not lacking	Same as Alternative B, only • Less likely that the amount of unsuitable habitat would constrain regeneration harvest • Timber harvest in multistoried foraging habitat could be deferred or modified to avoid reducing habitat	Same as Alternative C, only • Some timber harvest could take place in multistoried foraging habitat, especially when it can be designed to maintain & improve forage conditions	Same as Alternative D, only • Timber harvest for fuel treatment would not be affected by any of the vegetation standards
Effects on range			
Limited effects • In some cases, livestock management may need to be intensified or structural improvements added • Most likely to affect grazing on units east of the Continental Divide without aquatic direction in existing plans	Same as Alternative B	Same as Alternative B	Same as Alternative B, only • May have fewer effects because standards changed to less-restrictive guidelines

Comparing how the alternatives affect other resources

Alternative B	Alternative C	Alternative D	Alternative E
Effects on developed winter recreation			
• Would not preclude further development • New ski areas & expansions would have to incorporate design measures to provide lynx habitat need • Could affect timing of operations, where ski runs are located & costs associated with development	Same as Alternative B, only • Less likely to affect timing of ski area operations	Same as Alternative C	Less than Alternative C
Effects on minerals			
• No affect on availability • Some potential to increase costs for mineral exploration & development	Same as Alternative B	Same as Alternative B	Same as Alternative B, only • May have fewer effects because standards changed to less-restrictive guidelines
Effects on highways			
Little effect anticipated • Need to incorporate wildlife crossings in highway design, is already being done by state & federal agencies	Same as Alternative B	Same as Alternative B	Same as Alternative B
Effects on forest roads			
No restrictions on existing roads • New roads built in lynx habitat may be restricted to public use • Upgrades to existing roads that result in increased traffic speeds or volumes are discouraged	Same as Alternative B, only • Where upgrades to existing roads result in increased traffic speeds or volumes, they may be allowed if designed to reduce effects on lynx	Same as Alternative C	Same as Alternative C

Alternative B	Alternative C	Alternative D	Alternative E
Effects on changing land ownership			
Limited effect on land exchanges • Discourages disposing of lynx habitat by exchanging it away • Lynx habitat could be acquired	Same as Alternative B	Same as Alternative B	Same as Alternative B
Effects on land uses			
Projects would need to maintain lynx habitat connectivity	Same as Alternative B	Same as Alternative B	Same as Alternative B
Economic effects from limiting precommercial thinning			
• Based on historic average funding, about 120 jobs/year could be reduced & labor income decreased by $1.3 million/year • Based on full funding, about 360 jobs/year could be reduced & labor income decreased by $4 million/year	Same as Alternative B	• Based on historic average funding, about 70 jobs/year could be reduced & labor income decreased by $800,000/year • Based on full funding, about 210 jobs/year could be reduced & labor income decreased by $2.3 million/year	Same as Alternative B
Economic effects from limiting increases to groomed & designated over-the-snow routes			
No effect to the economy • Existing uses would continue • Some undesignated routes may see increased use • May be some local effects because outfitters cannot expand, but most cannot expand now	Less than Alternative B	Same as Alternative C	Same as Alternative C

Comparing how the alternatives affect other resources

Alternative B	Alternative C	Alternative D	Alternative E
Social effects			
• Higher use on existing designated or groomed over-the-snow routes could occur, changing user experience ‡ • Fewer employment opportunities due to decreases in precommercial thinning	• Over-the-snow user experience should not change as a result of Alternative C • Fewer employment opportunities due to decreases in precommercial thinning	Same as Alternative C, only • Employment opportunities more like no-action alternative, Alternative A	Same as Alternative C
Effects on environmental justice			
• No effects to any minority or low-income population or community • Input from all persons & groups has been considered	Same as Alternative B	Same as Alternative B	Same as Alternative B

‡ Grooming levels have been stable during the past five years & are not likely to increase during the next five, because the costs of machinery & grooming operations have increased, while the funding from the states to do grooming has not increased.

Chapter 3 Affected Environment & Effects

Introduction

Chapter 3 describes the potentially affected resources of the amendment area and the effects of the alternatives on these resources.

Chapter organization

Chapter 3 is organized into sections by resource. The sections are:

- Lynx
- Other wildlife & fish
- Fire
- Forests
- Plants
- Range
- Recreation
- Transportation
- Minerals
- Land ownership
- Special use permits
- Social/economic
- Other disclosures

Each section describes the affected environment for that resource and discloses the impacts of Alternative A, the no-action alternative, Alternative B, the Proposed Action and the other action alternatives, C, D and E.

Each resource section is supported by specialist reports and data in the Project Record.

NEPA regulations in Section 1500.5, Reducing Paperwork, says environmental documents should be short, written in plain language, analytic rather than encyclopedic and discuss only briefly issues that are not significant. This document has been written to meet that direction.

Nature of effects

The amendment is programmatic in nature, consisting of direction that would be applied to future management activities. It does not prescribe site-specific activities on the ground, or irreversibly commit resources. CEQ regulations define *direct effects* as those occurring at the same time and place as the amendment. There are no direct environmental consequences of the amendment; therefore this analysis discusses only *indirect* and *cumulative* effects of the alternatives. Direct effects would result from site-specific projects, and will be evaluated when those decisions are made.

In analyzing effects, it's assumed the standards would be met because complying with standards is mandatory. The analysis of effects is based primarily on projections of how future activities and areas would change because of the proposed standards. Such projections are inherently uncertain.

It's also assumed that the objectives generally would be achieved and the guidelines generally followed, though that may not always be true.

The baseline for effects disclosed in this chapter is the existing plans. The effects of existing plans have been previously determined and disclosed. This DEIS describes changes in effects resulting from incorporating lynx conservation measures.

Generally, effects are presented as changes from existing plans, represented by Alternative A. Some effects on lynx are presented by comparing them to Alternative B, the Proposed Action, which was designed to conserve lynx. Cumulative effects include the effects of the existing plans as disclosed in accompanying NEPA documents and incorporated by reference.

Significance of effects

NEPA requires an EIS to be prepared for proposals that significantly affect the quality of the human environment. This document was prepared as a DEIS based on the level of public interest.

The overall effect of the action alternatives is to reduce the likelihood of effects from future projects. This analysis has not identified any environmental effects likely to be significant. This DEIS discloses indirect effects of not taking future actions.

Analysis area

Amendment area

The amendment area includes lynx habitat in the 18 NF's and four BLM units described in Chapter 1. The amendment area includes more than half the lynx habitat in the Northern Rocky Mountains Geographic Area.

More than 50 million acres are inside the amendment area. Of these, about 18,571,000 acres are lynx habitat – see Table 3-1. Almost half of the NF lands, but just one percent of the BLM lands in the amendment area, have been mapped as lynx habitat – see Figure 3-1 and the *Proposed Action* section of Chapter 1 and Appendix B for a discussion of habitat mapping. About 43 percent of lynx habitat in the amendment area is available for development and active management – see Appendix E.

Analysis boundary

Generally, the boundary for evaluating effects, including cumulative effects is lynx habitat in LAUs in the amendment area. This boundary was chosen because for most resources, the effects of the amendment are limited to changes in direction for lynx habitat within the administrative boundaries of the units whose plans are being amended.

The analysis boundaries for economics and for lynx, as well as effects on human communities, are different. See those sections for descriptions of their analysis boundaries.

Some effects were evaluated based on data compiled for administrative units. Appendix K shows the data compiled by administrative unit. This DEIS does not contain data sufficient to develop direction unique to individual units.

Table 3-1. Lynx habitat in the amendment area

	FS	BLM	Total
Amendment area acres	38,530,000	14,830,000	53,360,000
Habitat acres in amendment area	18,470,000	101,000	18,571,000
Habitat percent of agency land	48%	1%	35%
Habitat acres in development allocations [1]	7,940,000	60,000	8,000,000
Percent habitat in development allocations	43%	60%	43%
Habitat acres in non-development allocations [2]	10,530,000	41,000	10,571,000
Percent habitat in non-development allocations	57%	40%	57%

[1] *Development land allocations* in existing plans allow *developments* like campgrounds and *active management* like timber sales

[2] *Non-development land allocations* are places where natural disturbance processes predominate, such as wilderness, roadless and semi-primitive non-motorized areas

Appendix E contains a more complete description of management area categories.

Analysis tools

GIS (Geographic inventory system)
GIS is a computerized mapping tool. GIS layers include:

- *Lynx habitat maps* – Each unit provided a map of lynx habitat based on vegetative data and snow depths – see Appendix B. Figure 1-1 is a compilation of those maps, used as a base layer for other analysis.
- *Linkage area maps* – Linkage areas were identified by an interagency group of biologists and state transportation planners, based on the criteria found in Appendix B. Figure 1-1 uses arrows to show the linkage areas. Linkage area maps were used to determine which highways might be affected by the amendment. The resulting map applies to all units in the amendment area.
- *Management area maps*, which were used to evaluate how much lynx habitat is in developmental and non-developmental or wilderness allocations. These maps apply to all units in the amendment area.
- *Fire perimeter maps*, which were used to evaluate how much lynx habitat in unsuitable condition exists in FS Region 1. This map applies to all units in FS Region 1 (Hillis et al. 2003).
- *2000 Census data map*, which identified human structures at a density of one per ten square miles, or 1/6,400. This map was used as a proxy for determining the WUI (wildland urban interface). The WUI was assumed to be the area within one mile of a structure. This map was used to evaluate the amount and type of lynx habitat in the WUI on the administrative units in Montana (Bush 2003).

FIA (Forest inventory and analysis)
FIA is a systematic collection of vegetative data across the United States, managed by FS Research and Development. FIA data for Montana was used to find the acres of lynx habitat with an abundance of small trees that would be within the reach of snowshoe hares in winter – this information was used as a proxy for winter snowshoe hare habitat. It was used to determine the amount of high- and low-density forests within and outside both wilderness and the WUI (Bush 2003).

Only Montana FIA data was used because it was the only data readily available. FIA data was collected in portions of Idaho last year, but had not been processed in time for this analysis. Montana provides a large sample of the amendment area because it contains about half of the amendment area's lynx habitat. Montana can serve as a surrogate for the entire amendment area, because northern Idaho is similar to western Montana, and southern Idaho, Wyoming and Utah are similar to southeastern Montana.

Typically, models that describe habitat include some quantification of a number of variables to assess how suitable areas are as habitat. Factors known or believed to be important in providing lynx habitat include:

- Snow depth and condition (fluffy not wet)
- Stand structure

- Vegetation type
- Density of small diameter trees that may provide snowshoe hare forage
- Availability of large down woody material for dens
- Stand size
- Juxtaposition of stands on the landscape

Other factors, such as slope aspect, may also play a role providing habitat for lynx. Knowledge about the quantification and relationships between these variables is limited.

This analysis rests largely on FIA data, which provided only a coarse level of data about Montana, consisting solely of stand structure and stem density. It's simply not possible, given the current level of knowledge, to incorporate the other variables into a model of lynx habitat.

The FIA analysis of hare habitat is most appropriately used as an index to compare relative effects among the alternatives. It does not provide a definitive assessment of how much or of the quality of snowshoe hare habitat. Because the other variables could not be included, the FIA analysis likely overstates the amount and quality of snowshoe hare habitat.

Data by unit
Each NF and BLM unit provided data about its activities in the amendment area and the acres that overlap lynx habitat. Data was provided about precommercial thinning, grazing allotments, designated and groomed routes, ski areas, special use agreements, minerals and forest roads – see Appendix K. The data was used to evaluate the potential effects on lynx and on each resource.

TSMRS (Timber stand management and resource system)
TSMRS is a computer program developed and used by FS Region 1 to track vegetation management. Each forest is broken down into large stands, and activities are tracked by stand. Such activities include but are not limited to timber harvest, planting, slashing, prescribed burning, reforestation surveys, etc. TSMRS data was used to evaluate the amount of lynx habitat was in unsuitable condition in Montana and to determine the amount of precommercial thinning scheduled during the next decade.

Cumulative effects analysis

Cumulative effects are summarized at the end of each resource section and supported by the information in Appendix L, which gives a description of all past, present and reasonably foreseeable actions in the amendment area. Appendix L also describes which actions are included in the cumulative effects analysis for each resource, and how or why some actions do not affect a particular resource.

Lynx

Analysis information

The analysis of the effects on lynx began with a review of literature related to Canada lynx and snowshoe hare biology, ecology and habitat relationships. Public comments collected during scoping were reviewed to see whether any additional information about lynx was supplied. Personal communications were conducted with FS, BLM and FWS biologists and with researchers investigating lynx and snowshoe hares.

Analysis boundary for lynx

The analysis evaluates the effects of the alternatives on lynx in the amendment area. Cumulative effects on lynx are evaluated for the entire Northern Rockies Geographic Area, an area with unique ecosystems and management histories (Ruediger et al. 2000).

Assumptions

1) The analysis of effects is based primarily on projections of changes in future actions because of the proposed standards.
2) The lynx habitat maps provided by BLM and FS administrative units were used as the geographic basis for assessing effects in lynx habitat – see the discussion of mapping in the *Proposed Action* section of Chapter 1.
3) Except for fire management and snow compaction, the majority of human-related effects on wildlife are in the development land allocations, where such things as ski areas and timber sales are allowed (Hickenbottom et al. 1999). See Appendix E.
4) Most effects to species are *short-term*, defined as the ten years from 2003 to 2013. *Long-term* effects are those expected to occur sometime after a decade. This time period was used because it's anticipated the plans subject to this amendment will be revised by 2013.
5) The direction provided in existing plans is adequate to provide habitat for species other than lynx. The LCAS provides recommendations to reduce or eliminate risks and provide for lynx habitat needs based on the most comprehensive recent information about threats and risks to conserving lynx.
6) Complying with the NFMA requirement to provide habitat for viable populations of lynx will be validated for the selected alternative, using a scientifically credible process and available data, and will be completed between the draft and final EIS.

Biology

Canada lynx are medium-sized forest carnivores occupying northern forests with abundant snowfall. They have long ear tufts, lightweight body frames and very large paws for their size, which act like snowshoes supporting them on top of fluffy snow.

Lynx tend to have very large home ranges, varying from about 15,000 to 30,000 acres or ten to 20 square miles.

They seem to prefer to move through continuous forests, and have been observed to avoid large openings until shrubs and trees provide enough cover to hide them (Ruggiero et al. 2000a; USDI FWS 2003). They tend to be reclusive so many people who've spent a lot of time in the woods in winter have never seen a lynx.

Snowshoe hares are the primary prey of lynx, making up from 35 to 97 percent of the diet (Ruggiero et al. 1994). Red squirrels may be an important alternate prey, especially when hare populations decline (Koehler 1990; O'Donoughue 1998). Indications are that the summer diet may include a greater variety of prey species (Mowat et al. 2000).

Lynx tend to be less successful hunters than other carnivores, like coyotes and owls, with which they compete. The main cause of lynx mortality is starvation – kittens and young adults both starve to death at high rates if prey – particularly snowshoe hares – is not abundant.

Habitat

Lynx habitat in the amendment area is characterized by abundant moisture, with deep winter snow. Habitat tends to be somewhat drier in the southern and eastern parts of the amendment area.

Lynx habitat includes primarily cool, moist subalpine fir and Engelmann spruce forests, and moist lodgepole pine forests.

Figure 3-1. Lynx photos

Lynx have light body frames





Lynx have big feet that let them walk on top of snow

Cool, moist forests of Douglas-fir, grand fir, western larch and aspen contribute to lynx habitat where intermingled with or adjacent to Engelmann spruce or lodgepole pine. In extreme northern Idaho and in northwestern Montana, cedar-hemlock forests also are considered lynx habitat (Ruggiero et al. 2000a).

Lynx habitat is found generally at mid to upper elevations. Lower elevations range from about 3,500 feet in the north to 7,000 feet in the southern parts of the amendment area.

Lynx use a variety of forest ages and structural stages. They use young regenerating forests and multistoried forests that provide habitat for snowshoe hares. They move through continuous forests, and frequently use ridges, saddles and riparian areas (Koehler 1990; Staples 1995). They use forests with abundant dead and down trees for dens to raise their kittens, especially when denning sites are close to foraging habitat. In the winter, lynx do not appear to hunt in openings, where the lack of cover limits habitat for snowshoe hares.

Lynx habitat is affected by natural disturbances such as fire, and vegetation management such as timber harvest and prescribed fires.

Where lynx occur

About 60 percent of lynx habitat in the lower 48 states occurs in the northern Rockies (USDI FWS 2003); the Northern Rockies Geographic Area likely has the largest lynx population of the five geographic areas defined for lynx. This is likely due to relatively high quality lynx habitat in large blocks fairly well connected throughout the geographic area and with Canada.

Lynx historically occurred in all four states of the amendment area (Ruggiero et al. 2000a). Their current distribution is more limited and is being studied. Surveys are being conducted in the northern Rockies to further determine lynx occurrence and distribution.

In *Idaho* lynx were never abundant but were distributed throughout northern portion of the state. Recent lynx presence has been documented and lynx continue to be present in north and north-Central Idaho (USDI FWS 2003).

In *Montana*, numerous historic and current lynx records exist in the western part of the state. A reproducing population exists in northwestern Montana – studies of this population began in 1998 and are continuing. In some mountain ranges in southwest Montana, lynx are present but in apparently low numbers where habitat becomes more marginal (more patchy and drier habitats) (USDI FWS 2003).

In Wyoming most historical and recent records of lynx are from the northwestern mountain ranges. A lynx study began in western *Wyoming* in 1996, where a radio-collared female produced four kittens in 1998. Recent snow-track surveys indicated lynx have declined and now are quite rare in northwestern Wyoming (Squires, pers. com.) The decline is likely because the habitat is naturally marginal (more patchy and drier forests) and less capable of supporting snowshoe hares

and is further from source populations (USDI FWS 2003).

There are only 10 verified records of lynx in Utah since 1916. In 2002, lynx hair was detected on the Manti-La Sal National Forest in *Utah* – before this, no lynx had been verified in Utah since 1991 most likely because forest habitat in Utah is remote and far away from source lynx populations (USDA FWS, 2003).

LAU (Lynx analysis unit)
An LAU is an area used to evaluate effects of management activities on individual lynx. It's about the size of a lynx home range, from 15,000 to 30,000 acres or about 25 to 50 square miles.

Lynx risk factors

The LCAS identified the following risk factor categories that could affect lynx:

- *Productivity*
- *Mortality*
- *Movement*

This analysis evaluates how the alternatives affect these risk factors and to what degree.

Productivity risk factors

In the biological sense, *productivity* means the ability of an organism to successfully reproduce. Successful reproduction involves not only giving birth, but also whether the offspring survive into maturity, themselves capable of reproducing.

Lynx productivity is directly related to the quantity and quality of habitat and indirectly related to competition with predators. Productivity risk factors are:

- *Foraging habitat*
- *Denning habitat*
- *Competition from other predators*

This analysis focuses on the risks to foraging and denning habitat, and evaluates how competition from predators affects productivity.

A considerable amount of lynx research has been conducted in Alaska and Canada (Ruggiero et al. 2000a), documenting certain habitat needs and relationships. Research is also underway in the contiguous United States. See Appendix F for a summary.

Foraging habitat

Lynx foraging habitat is defined as habitat that supports snowshoe hares or red squirrels (Ruediger et al. 2000).

Red squirrel habitat consists primarily of older, closed-canopied forests with substantial quantities of coarse woody debris.

Snowshoe hare habitat consists of places where young trees or shrubs grow densely, often thousands of woody stems per acre. Many studies have shown hares prefer dense stands (Fuller 1999; Hodges 2000a; Hodges 2000b; McKelvey and McDaniel 2001; Shaw 2002). During summer, snowshoe hares forage on forbs, grasses and small shrubs.

During winter, hare forage is limited to the twigs and stems that protrude above the snow and the hares can reach. *Since snowshoe hare forage is more limited during winter and hares are lynx primary winter prey, this analysis focuses on the effects of the alternatives to winter snowshoe hare habitat.* The terms *foraging habitat* and *winter snowshoe hare habitat* are used interchangeably in this analysis.

Vegetation that provides hares with hiding cover is also important.

Winter snowshoe hare habitat occurs in three stages of forest development, the *stand initiation, understory reinitiation* and *old forest multistoried* structural stages.

Stand structural stages

Figure 3-2. Vegetative structural stages and lynx habitat components

Structural stage	Description	Contribution to lynx habitat
Stand initiation, or young regenerating forests - - - ***Winter snowshoe hare habitat***	After a stand replacing fire or regeneration harvest, new seedlings establish and develop. A single- story layer of shrubs, tree seedlings and saplings grow.	*Unsuitable habitat* for about the first ten to 30 years after disturbance because the trees and shrubs are not tall enough to protrude above the snow. *Winter snowshoe hare habitat* after about ten to 30 years, if trees are dense enough and tall enough to protrude above the snowline in places that get deep snow.



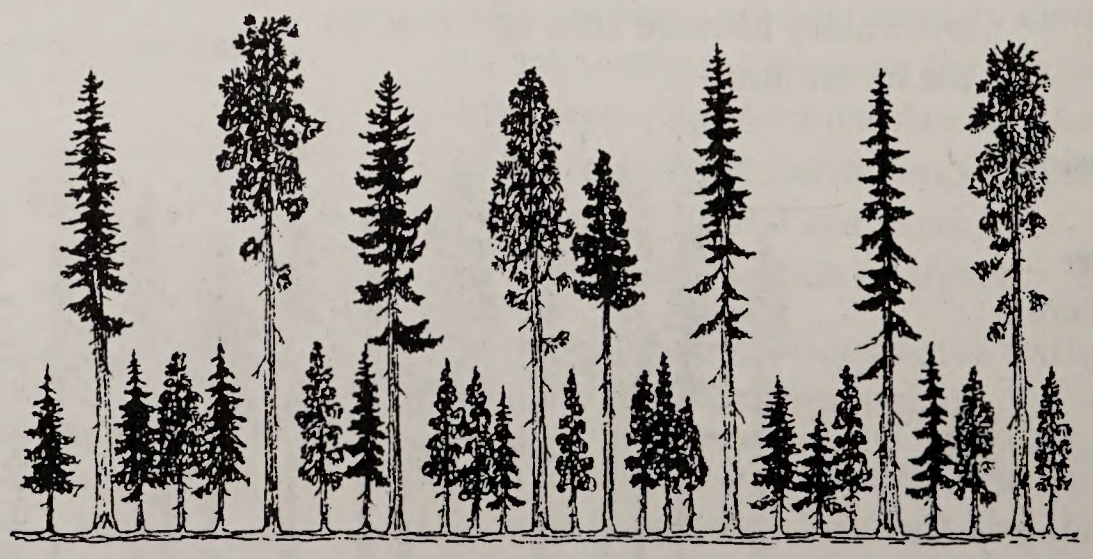
Stem exclusion - - - *<u>Not</u> winter snowshoe hare habitat*	Trees initially may grow fast, slowing down as they compete for sunlight and moisture. There's limited understory because little light reaches the forest floor.	Generally, not denning or hare habitat because the live tree crowns are too tall, and the understory and dead and down material too limited.



Structural stage	Description	Contribution to lynx habitat
Young forest multistoried - - - *Not winter snowshoe hare habitat*	In this stage, three or more tree layers become established after minor disturbances kill some overstory trees.	Generally not winter snowshoe hare habitat because only a limited understory has developed within the reach of snowshoe hares. *Denning habitat* if there's a large amount of coarse woody material.



Understory reinitiation, one of the older multistoried forests - - - ***Winter snowshoe hare habitat***	As the forest ages, some overstory trees begin to die or are removed, making openings where a new generation of understory trees can grow in a multistoried condition.	*Winter snowshoe hare habitat* if the understory is dense enough to provide cover and forage, and is within reach of hares. *Denning habitat* if there is a large amount of coarse woody material.



Structural stage	Description	Contribution to lynx habitat
Old forest – single storied - - - *Not winter snowshoe hare habitat*	Many generations and vegetation layers mark this structural class. It usually contains large old trees; decaying falling trees may be present, and it has no understory.	Generally not winter snowshoe hare habitat because it lacks the small understory trees that provide cover and forage for snowshoe hares. *Denning habitat* if there's enough coarse woody material.



Old forest – multi storied, the other older multistoried forest - - - ***Winter snowshoe hare habitat***	Some old forests develop a multistoried structure with an understory.	*Winter snowshoe hare habitat* if understory is dense enough to provide cover and forage, and is within the reach of hares. *Denning habitat* because it generally provides plenty of large coarse woody material.



Adapted from Oliver and Larson, 1996

Where & how winter snowshoe hare habitat occurs

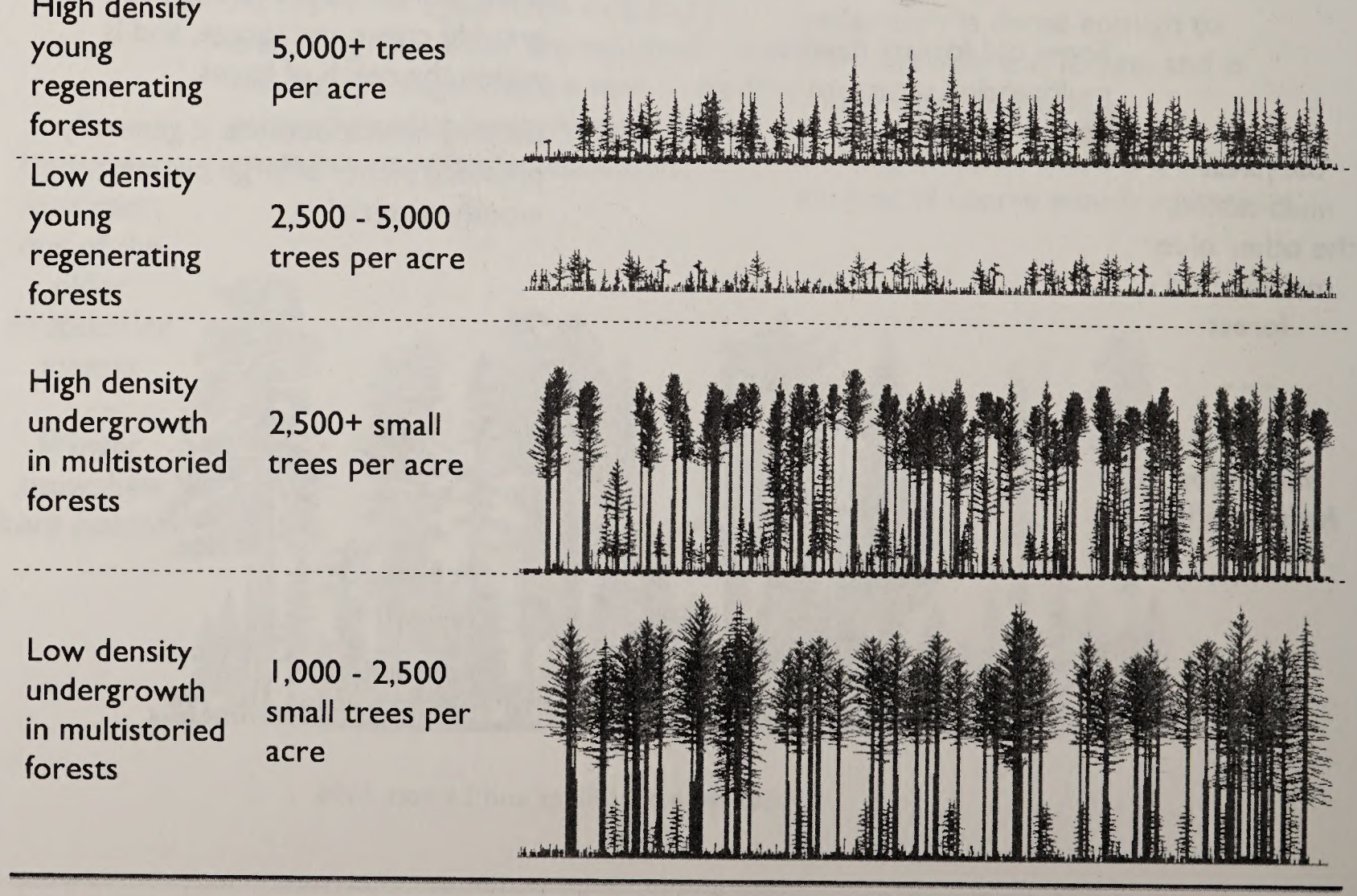
High densities of young trees and shrubs occur in different stages of forest development – see Figure 3-3.

The *stand initiation stage* consists of young regenerating forests when the trees are all about the same age and size. Generally, about ten to 30 years after disturbance trees grow tall enough to provide good winter snowshoe hare habitat. Stand replacing fire and regeneration timber harvests can create these conditions.

Unsuitable lynx habitat consists of young regenerating forests when the trees and brush are generally less than ten to 30 years old and have not yet grown tall enough to protrude above the snow in winter. As time passes, the trees will grow taller and may provide *winter snowshoe hare habitat* if dense enough. Later, they'll grow too tall and will be out the reach of snowshoe hares in winter.

The *understory reinitiation* and *old forest multistoried* are later stages in the life cycle of a forest. As the forest ages, tree heights begin to vary greatly, creating *multistoried forests*. Multistoried forests can provide winter snowshoe hare habitat in places where small trees and shrubs grow thick enough to support snowshoe hares. Multistoried forests are often good snowshoe hare habitat and may be used

Figure 3-3. Describing high and low density winter snowshoe hare habitat



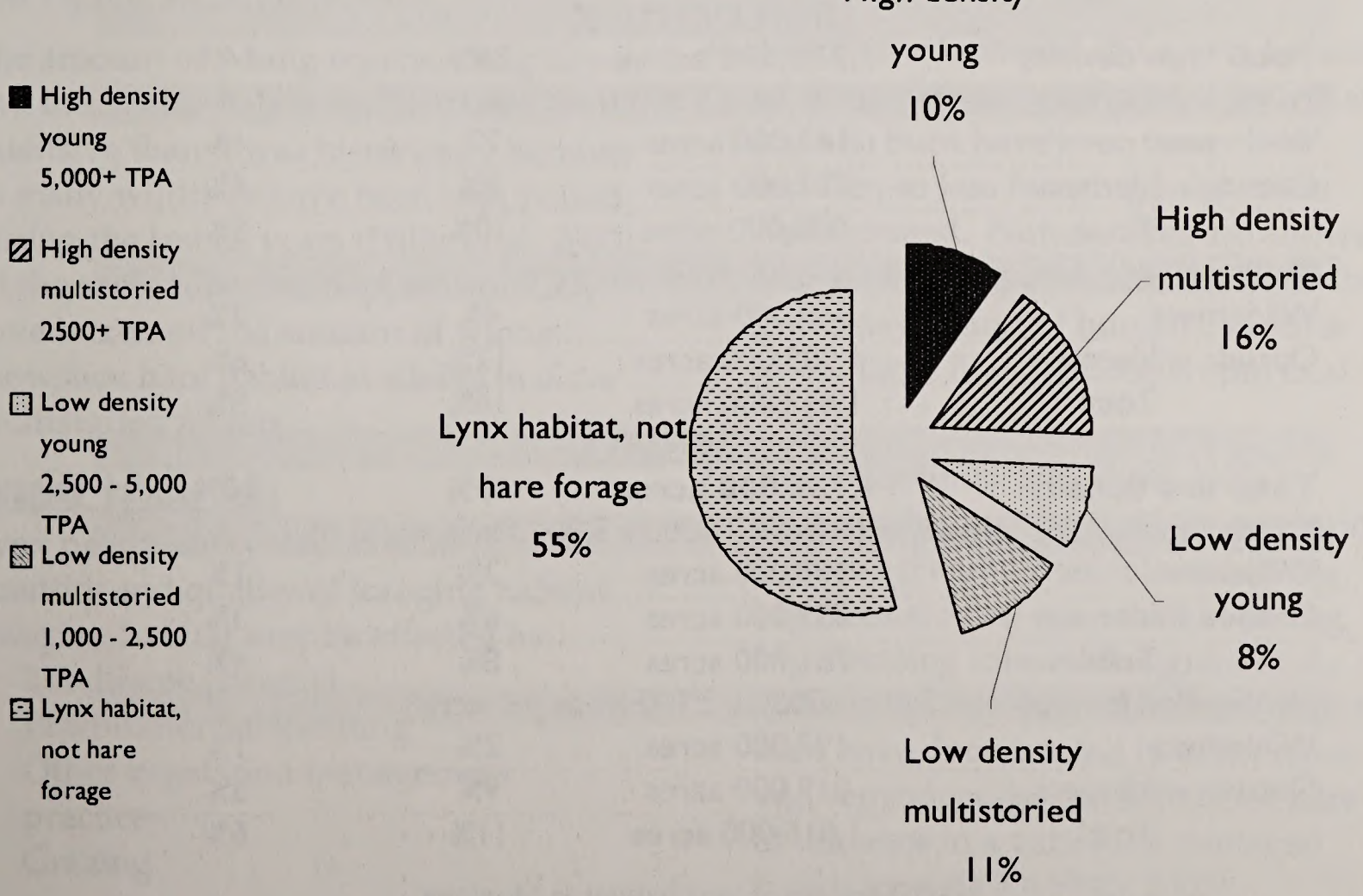
more in winter than dense young stands (Hodges, pers. com.; Squires, pers. com.)

Multistoried forest structures can develop from natural processes, such as insects and diseases and fire, or management actions like timber harvest can create small openings where trees and shrubs can grow.

For the purposes of this analysis, FIA data for Montana was used as a proxy for winter snowshoe hare habitat. The analysis evaluated how many acres of multistoried and young regenerating forests have an abundance of small trees per acre.

- It's likely young regenerating forests with 5,000 or more trees per acre less than five inches in diameter provide good foraging habitat (Ruggerio et al. 2000).
- Young regenerating forests with 2,500-5,000 trees per acre less than five inches in diameter may also provide foraging habitat depending on how the trees are distributed. Young forests with fewer trees may not provide enough cover for snowshoe hares.
- Multistoried forests with 2,500 or more trees per acre less than five inches in diameter also may provide good

Figure 3-4. Winter snowshoe hare habitat in Montana



Percentages shown are the percent of lynx habitat

foraging habitat where small trees occur in dense, irregular clumps underneath the overstory.

- Multistoried forests with 1,000 to 2,500 acre less than five inches in diameter may also provide good foraging habitat, depending on how the trees are distributed. Multistoried forests with less than 1,000 trees per acre may not provide enough cover for snowshoe hares.

Lynx evolved to adapt to an ever-changing forest condition. They require a mosaic of conditions of appropriate species composition, varying stand ages, and structure to support abundant snowshoe hare and lynx denning habitat. In addition, lynx are highly mobile, moving long distances to find abundant prey, and use a large area on the landscape as demonstrated by the large size of an average lynx home range (USDI FWS, 2003).

Table 3-2. Winter snowshoe hare habitat in Montana

	Area	Percent lynx habitat†	Percent NF lands‡
Unsuitable habitat	~ 900,000 acres	10%	- - -
Winter snowshoe hare habitat	4,120,000 acres	45%	24%
HIGH DENSITY			
Total high density	**2,353,000 acres**	**26%**	**14%**
Young regenerating forests, with at least 5,000 trees per acre			
Wilderness	143,000 acres	2%	1%
Outside wilderness	757,000 acres	8%	4%
Total	900,000 acres	10%	5%
Multistoried forests, with at least 2,500 trees per acre			
Wilderness	368,000 acres	4%	2%
Outside wilderness	1,085,000 acres	12%	6%
Total	1,453,000 acres	16%	8%
LOW DENSITY			
Total low density	**1,767,000 acres**	**19%**	**10%**
Young regenerating forests, with from 2,500 to 5,000 trees per acre			
Wilderness	198,000 acres	2%	1%
Outside wilderness	553,000 acres	6%	3%
Total	751,000 acres	8%	4%
Multistoried forests, with from 1,000 to 2,500 trees per acre			
Wilderness	197,000 acres	2%	1%
Outside wilderness	819,000 acres	9%	5%
Total	1,016,000 acres	11%	6%

† 9,060,000 acres of lynx habitat in Montana

‡ 17,454,000 acres of National Forest lands in Montana

The amount of winter snowshoe hare habitat may be overstated because variables, such as the size of openings and location, cannot be modeled – see the discussion of analysis tools on pages 3-4 & 3-5.

A distribution of *age classes* is important so there are always parts of each LAU providing winter snowshoe hare habitat. Montana contains 9,060,000 acres of lynx habitat. About ten percent is in unsuitable condition. Over time, some unsuitable habitat may develop into winter snowshoe hare habitat (Hillis et al. 2003). About 26 percent of the lynx habitat on NF lands in Montana has a high density of small trees and may provide good winter snowshoe hare habitat. An additional 19 percent may provide lower density habitat for snowshoe hares. Whether or not this additional area actually provides good snowshoe hare habitat depends on site-specific conditions like the tree species and spacing. See Table 3-2 on page 3-16 and Figure 3-4 on page 3-15.

The amount of young regenerating forests and unsuitable habitat is likely less extensive than it was historically because so many wildfires have been suppressed during the last 80 years (Hillis et al. 2003). At the same time, fire suppression may have increased the amount of winter snowshoe hare habitat available in older multistoried forests.

Foraging habitat risks

Lynx productivity depends on the quantity and quality of foraging habitat. Foraging habitat may be affected by:

- Landscape patterns
- Precommercial thinning
- Other vegetation management practices
- Grazing

Landscape pattern risks to foraging habitat

Timber harvest, fire, insect outbreaks, avalanches and wind all change landscape patterns. Fire plays an important role in lynx habitat. Stand-replacing fires burn mature forests and result in young regenerating forests.

Fire suppression can limit the creation of winter snowshoe hare habitat. Timber harvest creates young regenerating or multistoried forests.

Both fire and timber harvest can create unsuitable habitat, where the brush and trees are not yet tall enough to protrude above the snow. In some areas, too much unsuitable habitat may be created and in other places, not enough.

- In *non-developmental allocations*, because of fire suppression, the large fires that used to burn have been fewer and smaller, so less foraging habitat has been created. Natural fires are allowed to burn but may not mimic historic fire patterns because of human concerns about large fires (Hickenbottom et al. 1999).
- In *developmental allocations*, where timber sales are allowed, regeneration timber harvest (where almost all the big trees are cut) can result in young regenerating forests (Ruggiero et al. 2000a). Studies of lynx and snowshoe hare have documented lynx presence and reproduction and snowshoe hare abundance in a variety of managed landscapes (USDI FWS, 2003).

How sites are reforested can also change landscape patterns. Sometimes lodgepole pine is removed and western larch is planted or otherwise encouraged to grow, converting the forest from one predominant tree species to another – this is called a *type conversion*. Western larch may not provide winter forage for hares because it loses its needles and may not provide the vegetative cover hares need during winter.

Precommercial thinning risks to foraging habitat

Precommercial thinning reduces stem densities to increase the growth of the remaining trees. Precommercial thinning generally occurs when forests are 15 to 25 years old, about the same time young regenerating forests are beginning to provide winter snowshoe hare habitat.

Precommercial thinning may reduce stem densities and cover to the point that the young forests have little or no value for snowshoe hares (Ruggiero et al. 2000a).

Other vegetation management risks to foraging habitat

In multistoried forests, some fuel treatments and commercial timber sales may reduce winter snowshoe hare habitat because the small trees and brush that constitute foraging habitat are removed. Other projects may remove only tall trees and create openings, allowing new foraging habitat to develop.

Grazing risks to foraging habitat

Livestock grazing may reduce or eliminate foraging habitat in areas that grow quaking aspen and willow in riparian areas (Ruediger et al. 2000). These localized changes in habitat may affect individual lynx; however no information indicates that grazing poses a threat to overall lynx populations (USDI FWS, 2003, p. 40083).

Foraging habitat under Alternative A, no action

The BA, the Biological Assessment the FS and BLM completed on existing plans, found management direction generally lacking for foraging habitat – see Table 3-3.

Under the no-action alternative, management direction to conserve lynx would not be incorporated into the existing plans. Winter snowshoe hare habitat likely would decline both in quality and quantity.

Landscape patterns under Alternative A

Under Alternative A, wildfires would continue to be suppressed at current levels, removing fire as an ecosystem driver creating foraging habitat. In development allocations where timber sales are allowed, regeneration timber harvest is not likely to make up for removing fire because of other resource considerations (Hillis et al. 2003).

In FS Region 1, less than 13 percent of the LAUs exceed 30 percent unsuitable habitat. All were caused by wildfires in 1988 and 2000. About 13 percent had more than 15 percent unsuitable (Hillis et al. 2003); timber harvest caused very few to exceed 15 percent unsuitable.

In some areas, it's possible for individual lynx to be affected because of the distribution of foraging habitat. Where large patches of unsuitable habitat have resulted from fire and timber harvest, these patches likely will become forage over time. Other places may lack both unsuitable and forage habitat because they lack disturbance. Existing plans don't include management direction to provide a distribution of lynx habitat conditions.

Table 3-3. BA findings about whether existing plans are adequate to protect winter snowshoe hare habitat

	Fully or substantially	Marginally	Do not	Unknown or n/a
FS plans (20 in amendment area)				
Fire management	30%	55%	15%	- - -
Landscape patterns	15%	70%	15%	- - -
Precommercial thinning	10%	55%	35%	- - -
Habitat conversions	5%	35%	60%	- - -
Foraging habitat	35%	65%	- - -	- - -
BLM plans (nine in amendment area)				
Fire management	- - -	11%	89%	- - -
Landscape patterns	- - -	22%	33%	45%
Precommercial thinning	- - -	33%	11%	56%
Habitat conversions	22%	33%	- - -	45%
Foraging habitat	- - -	11%	22%	67%

Fire management - Existing plans direct fire management to provide or improve lynx habitat
Landscape patterns - Existing plans results in landscape vegetation patterns suitable for lynx habitat
Precommercial thinning - Existing plans direct integrating lynx habitat needs in thinning projects
Habitat conversions - Existing plans prohibit conversions that reduce habitat suitability
Foraging habitat - Direction in existing plans would provide winter snowshoe hare habitat

Type conversions could occur and in some places reforestation could result in species that don't provide adequate winter cover for snowshoe hares.

Precommercial thinning under Alternative A
About 400,000 acres of lynx habitat may be ready for precommercial thinning during the next decade. It's unlikely funding would be available to thin all these acres. In the recent past – the five years before lynx were listed as threatened – an average of about 20,000 acres per year were funded both inside and outside lynx habitat.

Under Alternative A, all thinning funded would be allowed, reducing foraging habitat on thinned acres. Various studies have shown that thinning reduces snowshoe hare densities. Preliminary findings from research underway in Montana suggest precommercially thinned forests have lower snowshoe hare densities than unthinned forests (Hodges and Griffin, pers. com.)

For more information about thinning, see the *Forests* section later in Chapter 3; for a discussion about how funding affects thinning, see the *Economics* section.

Fuel treatments under Alternative A
Fuel treatments would not be limited under Alternative A. Fuel treatments mostly take place in multistoried forests but also sometimes occur in young regenerating forests. They are likely to reduce winter snowshoe hare habitat if they reduce the density of small trees. During the next decade, 540,000 acres of fuel treatment are projected for Montana. Some of these acres would be inside lynx habitat – see the *Fire* section.

An analysis using Montana FIA and fuel treatment data was conducted to approximate the potential effects – see Table 3-4 and the discussion in the summary for effects of Alternative A.

Other vegetation management under Alternative A
Other vegetation management activities could occur in multistoried winter snowshoe hare habitat, such as using prescribed burning to restore whitebark pine. In some whitebark pine forests, understory trees may need to be removed before burning. During the next decade, about 50,000 acres of whitebark pine restoration could occur without using precommercial thinning. See the *Forests* and *Plants* sections later in Chapter 3.

Timber harvest could also affect foraging habitat, but how many acres might be affected is not known. See the *Forests* for a description of the kinds of management actions that take place.

Where such activities remove foraging habitat, that would be detrimental to lynx; where foraging habitat is maintained or prolonged, that would be beneficial. Under Alternative A, no changes would be made to incorporate management direction to prolong or protect winter snowshoe hare habitat.

Grazing under Alternative A
About 1,700 active grazing allotments overlap lynx habitat in the amendment area. About 15 percent lack management strategies that result in habitat conditions favorable for lynx. Under Alternative A, grazing on these almost 250 allotments may reduce hare foraging habitat in aspen, willows and riparian areas, or in

shrub-steppe areas, which could reduce localized habitat conditions favorable for lynx.

Summary of effects on foraging habitat under Alternative A

To evaluate the combined effects of precommercial thinning, fuel treatments and whitebark pine restoration, an analysis was done for Montana. Only Montana was included because FIA data was readily available only for this state.

The effects on foraging habitat in the other amendment-area states are likely to be similar to Montana's.

Alternative A could reduce high-density winter snowshoe hare habitat by 14 percent if all activities are fully funded – see Table 3-4. If both high- and low-density habitat were considered, then only nine percent would be affected because there are more acres unaffected.

Table 3-4. Montana hare forage affected under Alternative A in a decade with full funding

	High density 2,353,000 acres	Low density 1,767,000 acres	Total 4,120,000 acres
Precommercial thinning	213,000 acres	0	213,000 acres
Fuel treatment	65,000 acres	55,000 acres	120,000 acres
Whitebark pine restoration	40,000 acres	0	40,000 acres
No treatment	2,035,000 acres	1,712,000 acres	3,747,000 acres
Percent winter snowshoe hare habitat treated	14% [1]	3% [2]	9% [3]
Timber harvest	Unknown – some detrimental, some beneficial	Same	Same
Grazing	0	Some hare forage could potentially be reduced in local areas on 250 allotments	Same

Montana acres only

[1] 213,000 + 65,000 + 40,000 / 2,353,000 acres high density = 14%

[2] 55,000 / 1,767,000 acres low density = 3%

[3] 213,000 + 120,000 + 40,000 / 4,120,000 acres total = 9%

Assumptions

Precommercial thinning and whitebark pine restoration would occur only in high-density winter snowshoe hare habitat and would be fully funded

Fuel treatment would occur in proportion to the amount of forested habitat

Other information

About 213,000 of the 400,000 acres of precommercial thinning scheduled in winter snowshoe hare habitat in the amendment area, are in Montana.

About 120,000 of the 540,000 acres of fuel treatment projected for the next decade in Montana, would occur in high or low density winter snowshoe hare habitat

About 40,000 of the 50,000 acres of whitebark pine restoration scheduled in the amendment area are in Montana

Precommercial thinning may result in the greatest effect since almost a quarter[1] of the high-density young forests would be thinned at full funding.

These estimates are likely high because in the recent past, precommercial thinning has been funded only about 34 percent (see the *Economics* section) and because fuel treatments in lynx habitat may not occur to the extent predicted. In lynx habitat, many of the forests have not missed a fire cycle, so even though they are subject to crown fires, fewer fuel treatments may occur. It's likely the priority for fuel treatments would be outside lynx habitat – see the *Fire* section later in Chapter 3.

[1] 213,000 / 900,000 high density young forests = 24%

Foraging habitat under Alternative B

Alternative B would add management direction to existing plans promoting winter snowshoe hare habitat. Table 2-1 in Chapter 2 contains the full text.

- Objectives VEG O1, VEG O2, VEG O3, VEG O4 and GRAZ O1 support emulating historic disturbances that would create and maintain foraging habitat.
- Standards VEG S1, VEG S2, VEG S5, VEG S6, GRAZ S1, GRAZ S2, GRAZ S3 and GRAZ S4 are discussed below.
- Guideline VEG G1 emphasizes considering creating more foraging habitat where it's lacking.

Landscape patterns under Alternative B
Objective VEG O1 describes managing vegetation similar to historic disturbance processes. Objective VEG O3 describes conducting fire use activities to restore ecological processes and maintain or improve lynx habitat. Objective VEG O4 describes designing regeneration harvest and reforestation to develop characteristics suitable for winter snowshoe hare habitat.

Standards VEG S1 and VEG S2 limit how much lynx habitat in an LAU can be made unsuitable by vegetation management. The overall limit is 30 percent; timber harvest is limited to 15 percent in a decade. Under Alternative B, these standards could limit prescribed fire and timber harvest at the scale of an LAU. They would help provide an even flow of winter snowshoe hare habitat over time.

Alternative B also includes Guideline VEG G1 that encourages creating winter snowshoe hare habitat where it's lacking.

Precommercial thinning under Alternative B
Standards VEG S5 and VEG S6 would defer precommercial thinning while forests provide foraging habitat.

Under Alternative B, precommercial thinning could be deferred on as much as 20,000 acres a year, given historic average funding (see the *Economics* section later in Chapter 3). The dense stands would continue to provide foraging habitat.

During the next decade, precommercial thinning would be allowed on an estimated 2,200 acres within 200 feet of buildings – see Table 3-5. This is likely to have a negligible effect on lynx because of the small, scattered acreage and its proximity to human activity.

Fuel treatments under Alternative B
While forests are providing foraging habitat, Alternative B would restrict fuel treatments done by precommercial or understory thinning. Prescribed burning or timber harvest could be used to reduce fuels because they are not specifically prohibited.

Other vegetation management under Alternative B
Alternative B does not restrict timber harvest from removing foraging habitat.

Table 3-5. Lynx habitat that could be thinned next decade under Alternative B

Precommercial thinning	Acres winter snowshoe hare habitat
Within 200 feet of administrative sites, dwellings or outbuildings	2,190 acres

Some foraging habitat could be lost depending on project design, but how much is not known. Projects could be beneficial in multistoried forests if they prolonged or maintained the small trees and brush that constitute hare habitat, but detrimental if they removed the undergrowth.

Grazing under Alternative B
Standards GRAZ S1, GRAZ S2, GRAZ S3 and GRAZ S4 would make sure livestock grazing in lynx habitat was managed in ways that make it possible for trees, shrubs and aspen to regenerate. Shrub-steppe habitat and riparian areas would be managed similar to historic conditions, helping maintain and provide foraging habitat and cover.

Summary of effects on foraging habitat under Alternative B
On Montana NFs, Alternative B could result in a three percent reduction of high-density forage habitat if all activities were fully funded – see Table 3-6.

However, it's likely this estimate is high because fewer fuel treatments probably would occur because many forests in lynx habitat have not missed a fire cycle. The priority for fuel treatments is likely to be in forests that have missed at least one fire cycle.

Only a limited amount of precommercial thinning in young regenerating forests would be allowed under Alternative B, so that activity would have a limited effect.

Table 3-6. Montana hare forage affected under Alternative B in a decade with full funding

	High density 2,353,000 acres	Low density 1,767,000 acres	Total 4,120,000 acres
Precommercial thinning	1,000 acres	0	1,000 acres
Fuel treatment	33,000 acres	27,000 acres	60,000 acres
Whitebark pine restoration	40,000 acres	0	40,000 acres
No treatment	2,279,000 acres	1,740,000 acres	4,019,000 acres
Percent winter snowshoe hare habitat treated	3% [1]	1% [2]	2% [3]
Timber harvest	Unknown – some detrimental, some beneficial	Same	Same
Grazing	No effect	No effect	No effect

[1] 1,000 + 33,000 + 40,000 / 2,353,000 = 3%
[2] 27,000 / 1,767,000 = 1%
[3] 1,000 + 60,000 + 40,000 / 4,120,000 = 2%

Assumptions
Whitebark pine restoration would occur only in high-density winter snowshoe hare habitat.
Only half as many fuel treatments would occur as under Alternative A, because prescribed burning or commercial timber harvest would be the only tools available – understory and precommercial thinning would not be allowed
Fuel treatments would be fully funded
Other information
About 1,000 of the 2,190 acres of precommercial thinning scheduled in lynx habitat are in Montana

Foraging habitat under Alternative C

Alternative C would add the same management direction as the Proposed Action, except:

- Standards VEG S1, VEG S5 and VEG S6 are changed as discussed below
- Standard VEG S2 is replaced by Guideline VEG G6

Landscape patterns under Alternative C

Standard VEG S1 would increase the size of area to which the 30 percent unsuitable habitat limit was applied, to an LAU or a fixed combination of adjacent LAUs.

Fire has been documented to occur in the amendment area at scales many times larger than a single LAU or even multiple LAUs (Hillis et al. 2003). The LCAS identified historic fire disturbance patterns as a desired condition of lynx habitat. Expanding the size of the area would allow projects that more closely reflect historic fire disturbance patterns.

Compared to Alternative B, it's possible individual lynx would more likely be affected by expanding the size of area, because an LAU may have large patches of unsuitable habitat. However, because the multiple-LAU scale comes closer to historic disturbance patterns than a single LAU, Alternative C may provide greater benefits to lynx populations as a whole over the long term.

Standard VEG S2 would be changed to Guideline VEG G6. The amount of timber harvest resulting in unsuitable habitat during a decade would have to be considered, but not limited if justified by other needs. In FS Region 1, timber harvest has resulted in more than 15 percent unsuitable habitat in 13 percent of the LAUs (Hillis et al. 2003). The change to a guideline is likely to have limited effect.

Guideline VEG G1, encouraging projects that create or extend forage habitat, is changed to target the stem exclusion stage, which has little or no value for snowshoe hares.

Vegetation management under Alternative C

Alternative C modifies Standards VEG S5 and VEG S6 to apply to all vegetation management projects not just precommercial thinning. The only projects allowed would be research, genetic tree tests and within 200 feet of buildings.

In young regenerating forests, precommercial thinning would most likely be the activity restricted because few other vegetation management projects occur. About 4,000 acres of precommercial thinning during the next decade would be allowed, affecting less than one-half of one percent[2] of the winter snowshoe hare habitat – see Table 3-7.

Table 3-7. Lynx habitat that could be thinned next decade under Alternative C

Precommercial thinning	Acres winter snowshoe hare habitat
Research	1,450 acres
Genetic tree tests	220 acres
Within 200 feet of administrative sites, dwellings or outbuildings	2,190 acres
Total	3,860 acres

The effects on lynx are likely minimal because most projects would take place near some form of human habitation.

In multistoried forests, only research projects and precommercial thinning within 200 feet of buildings would be allowed. How many acres this amounts to is not known, but likely few.

Grazing under Alternative C
Grazing direction is the same as Alternative B, so the effects are the same.

Summary of effects on foraging habitat under Alternative C
In Montana NFs, Alternative C would reduce high-density winter snowshoe hare habitat at most by less than one percent – see Table 3-8. Alternative C generally would have beneficial effects on lynx in the short term because existing foraging habitat would not be reduced.

Habitat does not remain static over time – some kind of disturbance is needed to maintain the dense understory favorable for snowshoe hares in multistoried forests. Alternative C would depend more heavily on natural processes to do the job.

Table 3-8. Montana hare forage affected under Alternative C in a decade with full funding

	High density 2,353,000 acres	Low density 1,767,000 acres	Total 4,120,000 acres
Precommercial thinning	3,000 acre	0	3,000 acres
Fuel treatment	0	0	0
Whitebark pine restoration	0	0	0
No treatment	2,350,000 acres†	1,767,000 acres	4,117,000 acres
Percent winter snowshoe hare habitat treated	Less than 1%	No effect	Less than 1%
Timber harvest	No effect	No effect	No effect
Grazing	No effect	No effect	No effect

Other information
About 3,000 of the 4,000 acres of precommercial thinning scheduled in lynx habitat are in Montana
No fuel treatments or whitebark pine restoration would take place in winter snowshoe hare habitat

Foraging habitat under Alternative D

Alternative D would add the same management direction as Alternative C, except the scale at which Standard VEG S1 would be applied is changed, and more activities are permitted under Standards VEG S5 and VEG S6.

Landscape patterns under Alternative D

Standard VEG S1 would further increase the size of the area to which the 30 percent unsuitable habitat limit is applied, to a sub-basin or isolated mountain range. This size of area is large enough to mimic large-scale historic disturbance patterns like large fires.

Under Alternative D, it's even more possible that individual lynx could be affected, because the distribution of foraging habitat over broad areas is more likely to fluctuate than under Alternatives B or C. Whole LAUs could end up unsuitable, similar to what may have happened under natural disturbance patterns. However, because the sub-basin or isolated mountain range scale would allow historic disturbance patterns to be fully factored in, Alternative D may provide greater long-term benefits to lynx populations as a whole.

The requirement to restrict timber-harvest-created unsuitable habitat to 15 percent is dropped. Timber harvest has resulted in more than 15 percent unsuitable habitat in less than 13 percent of the LAUs in FS Region 1 (Hillis et al. 2003). It's unlikely extensive regeneration harvest would occur anyway because of concerns about other resources – so dropping this standard is likely to have a limited effect.

Precommercial thinning & other vegetation management under Alternative D

Standards VEG S5 and VEG S6 would allow some vegetation management projects that reduce foraging habitat.

Table 3-9. Lynx habitat that could be thinned next decade under Alternative D

Precommercial thinning	Acres winter snowshoe hare habitat
Research	1,450 acres
Genetic tree tests	220 acres
Within 200 feet of administrative sites, dwellings or outbuildings	2,190 acres
Aspen	3,050 acres
Whitebark pine	9,110 acres
Lodgepole pine	34,550 acres
Subtotal	*50,570 acres*
Daylight thinning where 80% of the cover is retained	
Planted western white pine	51,090 acres
Ponderosa pine	11,660 acres
Western larch	123,160 acres
Subtotal daylight thinning only	*186,000 acres*
Total	236,480 acres

20% snowshoe hare forage may be reduced on day light thinning acres = 20% of 186,000 = 37,200 acres
+ 50,570 acres traditional thinning = 87,770 acres where snowshoe hare forage may be reduced

In young regenerating forests, precommercial thinning would be allowed in the following situations:

- Research could be done
- Genetic tree tests could occur
- Vegetation could be thinned within 200 feet of administrative sites, dwellings and outbuildings
- Conifers could be thinned out around aspen
- Thinning and prescribed fire could be done to restore whitebark pine or to develop future old growth characteristics in lodgepole pine
- *Daylight thinning* – where the competitors are weeded out from around selected trees – could occur around western larch, ponderosa pine and planted rust-resistant western white pine if 80 percent of the hare forage is retained. Daylight thinning may have a less detrimental effect on snowshoe hares than traditional thinning since so much cover is retained, but it's unknown how hares will respond.

Forage is likely to be reduced somewhere from 87,000 to 236,480 acres during the next decade.

Retaining 80 percent of the cover in the 186,000 acres of daylight thinning may reduce the loss of foraging habitat. The worst-case scenario would be that winter snowshoe hare habitat would be greatly reduced on all thinned acres – see Table 3-9.

In multistoried forests, Alternative D would preclude most vegetation management. Projects could be done to restore western larch, ponderosa pine and planted white pine where 80 percent of the cover is retained. Whitebark pine restoration projects also would be allowed.

Vegetation management projects could occur if it improved or maintained foraging habitat in the long term. Small openings could be created or mid-height trees removed so small trees and brush could grow. How many acres might be involved is unknown.

Grazing under Alternative D
Grazing direction is the same as Alternatives B and C, so the effects are the same.

Summary of effects on foraging habitat under Alternative D
On Montana NFs, Alternative D could result in a seven percent reduction of high-density winter snowshoe hare habitat and an overall reduction of about four percent – see Table 3-10.

Alternative D could reduce forage habitat in young regenerating forests by about 15 percent[3] during the next decade. Since thinning reduces snowshoe hare habitat, any reduction may have an adverse effect on lynx. Whitebark pine restoration projects could reduce forage. In multistoried forests, projects that prolong or maintain forage habitat could have either no effect or a beneficial effect over time.

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[3] 139,000 / 900,000 high density young forests = 15%

Table 3-10. Montana hare forage affected under Alternative D in a decade with full funding

	High density 2,353,000 acres	Low density 1,767,000 acres	Total 4,120,000 acres
Precommercial thinning	139,000 acres	0	139,000 acres
Fuel treatment	0	0	0
Whitebark pine restoration	40,000 acres	0	40,000 acres
No treatment	2,195,000 acres	1,767,000 acres	3,962,000 acres
Percent winter snowshoe hare habitat treated	8% [1]	0	4% [2]
Timber harvest	Limited – must maintain or improve forage over long term	Same	Same
Grazing	No effect	No effect	No effect

[1] 139,000 + 40,000 / 2,353,000 = 8%
[2] 139,000 + 40,000 / 4,120,000 = 4%

Other information
No fuel treatments would occur
About 139,000 of the 236,500 acres of precommercial thinning allowed are in Montana
About 40,000 of the 50,000 acres of whitebark pine restoration are in Montana

Foraging habitat under Alternative E

Landscape patterns under Alternative E
Alternative E has the same objectives as Alternative B, and Guideline VEG G1 is the same as under Alternative C.

Standard VEG S1 would apply the 30 percent unsuitable habitat limit to an LAU or a fixed combination of adjacent LAUs, the same as in Alternative C. Alternative E would not limit fuel treatment projects that may make lynx habitat unsuitable. Fuel treatment may proceed even if an LAU already exceeds 30 percent unsuitable. Since this situation describes only a few LAUs and they're recently burned areas, they're unlikely to need fuel treatment in the near future.

Vegetation management under Alternative E
Under Alternative E, Standard VEG S5 only limits precommercial thinning, as in Alternative B, not all vegetation projects, as in Alternatives C and D. Alternative E would allow precommercial thinning projects in young regenerating forests for fuel treatment, research, genetic tree tests and within 200 feet of buildings. About 4,000 acres could be precommercially thinned – see Table 3-11.

Since precommercial thinning is the primary activity in young regenerating forests there are likely to be few other effects to these forests caused by other vegetative management.

Under Alternative E, Standard VEG S6 is replaced by a less restrictive guideline, Guideline VEG G8. Winter snowshoe hare habitat in multistory forests would have to be considered when designing projects, but the projects could remove forage habitat when justified by other needs.

It's assumed fuel treatments would proceed in winter snowshoe hare habitat because of the need to reduce hazardous fuels and would reduce about four percent of winter snowshoe hare habitat.

Grazing under Alternative E
Grazing direction is replaced with a less restrictive guideline under Alternative E. If the guideline is not followed in some areas then potential snowshoe hare habitat could be reduced which may affect an individual lynx. However, there is no information that grazing poses a threat to lynx populations (USDI FWS, 2003); therefore the effects would only be localized and would not affect the population as a whole.

Table 3-11. Lynx habitat that could be thinned next decade under Alternative E

Precommercial thinning	Acres of winter snowshoe hare habitat
Research	1,450 acres
Genetic tree tests	220 acres
Within 200 feet of administrative sites, dwellings or outbuildings	2,190 acres
Total	3,860 acres

Table 3-12. Montana hare forage affected under Alternative E in a decade with full funding

	High density 2,353,000 acres	Low density 1,767,000 acres	Total 4,120,000 acres
Precommercial thinning	3,000 acres	0	3,000 acres
Fuel treatment	65,000 acres	55,000 acres	120,000 acres
Whitebark pine restoration	40,000 acres	0	40,000 acres
No treatment	2,245,000 acres	1,712,000 acres	3,957,000 acres
Percent winter snowshoe hare habitat treated	5% [1]	3% [2]	4% [3]
Timber harvest	Limited – must maintain or improve forage over long term	Same	Same
Grazing	Limited localized effect	Limited localized effect	Limited localized effect

[1] 3,000 + 65,000 + 40,000 / 2,353,000 = 5%
[2] 55,000 / 1,767,000 = 3%
[3] 3,000 + 120,000 + 40,000 / 4,120,000 = 4%

Other information
About 3,000 of the 4,000 acres of precommercial thinning scheduled in lynx habitat are in Montana
All fuel treatment projected to occur in high and low density winter snowshoe hare habitat would take place
Whitebark pine restoration would take place
40,000 of the 50,000 acres of whitebark pine restoration scheduled are in Montana

Summary of effects on foraging habitat under Alternative E

On Montana NFs, Alternative E could result in a five percent reduction of high-density winter snowshoe hare habitat and an overall reduction of four percent – see Table 3-12. Alternative E would have only a limited effect on young regenerating forests since most precommercial thinning is precluded and fuel treatments are not likely.

In multistoried forests fuel treatments could reduce or eliminate winter snowshoe hare habitat on about 120,000 acres by removing the understory vegetation.

Denning habitat

Lynx productivity may also be affected by the availability of denning habitat. *Denning habitat* consists of the woody debris in which lynx make their dens – root wads, wind-thrown piles or large down trees. It's used for birthing and rearing kittens. The debris protects the kittens from predators and from weather.

For denning habitat to be useful to lynx, it generally needs to be in or near foraging habitat. Because kittens are not very mobile early on, and the mother has to hunt to feed herself and her kittens, the juxtaposition of denning and foraging habitat is especially important.

Where denning habitat occurs

Denning sites may be found in regenerating forests disturbed at least 20 years ago and in older forests (Slough 1999) and young forests with residual dead and down trees (Squires, pers. com.). In northwest Montana, most dens are under a deadfall of large trees, but smaller logs are also used for dens when jack-strawed or in piles (Squires, pers. com.).

The important component for all lynx den sites appears to be the amount of down woody debris present, not the age of the forest (Mowat et al. 2000, USDI FWS, 2003)

No quantitative assessment is available of the amount and distribution of woody material in the amendment area. Denning habitat is evaluated based on site-specific information available at the project level.

The BA found that generally denning habitat is likely not a limiting factor in the amendment area because most existing plans include direction to provide for old growth or retain dead and down material (Hickenbottom et al. 1999). Plans for the Ashley, Bighorn and Deerlodge NF's and the BLM lands include no such direction.

Denning habitat risks

Anything that reduces the density of woody debris in lynx habitat may constitute a risk to denning habitat. Losing denning habitat may affect the survival of kittens.

Risks to denning habitat include logging and fire. Prescribed fires and timber harvest remove woody material and may affect what's available. Salvage logging in particular removes denning habitat and potential denning habitat because it removes dead and down trees.

Denning habitat under Alternative A, no action

Most existing plans contain provisions to retain dead-and-down woody material or to maintain old growth habitat, which the BA deemed adequate to meet lynx denning needs (Hickenbottom et al. 1999).

For those units whose plans contain either very limited, incidental or no direction, denning habitat could be reduced under

Table 3-13. BA findings about whether existing plans provide for denning habitat

	Fully or substantially	Marginally	Does not	Unknown or n/a
Twenty FS plans	80%	10%	10%	- - -
Nine BLM plans	- - -	11%	33%	56%

Alternative A, so successful reproduction and kitten survival could be affected.

Under the no-action alternative, management direction to conserve lynx would not be incorporated into existing plans. Adequate denning habitat would be available on units with old growth or dead and down direction, and likely not available where such direction is lacking.

Denning habitat under Alternative B

Alternative B would add management direction to provide denning habitat.

- Objective VEG O2 says foraging habitat should be next to denning habitat
- Standards VEG S3 and VEG S4 are discussed below
- Guidelines VEG G2, VEG G3 and HU G1 emphasize locating foraging habitat near denning habitat, retaining denning habitat where it's unlikely to be consumed by stand-replacing fire and retaining woody debris when developing or expanding ski areas.

Standard VEG S3 requires ten percent denning habitat be provided in each LAU on lands capable of producing it, which would be beneficial for lynx.

Standard VEG S4 allows salvage logging in disturbed areas five acres or smaller only where public safety is at risk, such as in recreation sites or road or trail corridors. The area involved is likely to be small, and since the BA said denning habitat is probably not limiting in most of the amendment area, the effect on lynx of allowing this logging is likely negligible.

For plans lacking it, Alternative B would add management direction to provide for denning habitat, increasing the likelihood that denning habitat would be available and distributed across all LAUs in the amendment area, which would be beneficial to lynx.

Denning habitat under Alternative C

Alternative C is similar to Alternative B except that Standard VEG S4 allows salvage logging within 200 feet of dwellings, as well as for public safety. Again, because the area involved is small and close to human habitation, the effect on lynx is likely negligible.

Alternative C would add management direction increasing the likelihood that denning habitat would be provided and distributed in lynx habitat across all LAUs in the amendment area, which would be beneficial to lynx.

Denning habitat under Alternatives D & E

Alternatives D and E modify Standard VEG S3 to say where ten percent denning habitat is not present, projects should avoid reducing it, or if they do reduce it, the effects will be mitigated. Mitigation may involve retaining standing dead trees and coarse woody debris to provide future denning sites, which would be beneficial to lynx.

Standard VEG S4 is changed to a guideline, so retaining dead trees in disturbed areas of five acres or smaller is no longer mandated, but would need to be considered.

Alternatives D and E would add management direction increasing the likelihood that denning habitat would be provided and distributed in lynx habitat across all LAUs in the amendment area,

which would be beneficial to lynx. These alternatives may result in some loss of denning habitat compared to Alternatives B and C, because the standard restricting salvage harvest is changed to a guideline.

Competition from other predators

Lynx have very large feet in relation to their body mass, providing them a competitive advantage over other carnivores in deep snow. Snow compaction may allow *competing carnivores* – primarily coyotes but also mountain lions and bobcats – winter access along compacted routes into lynx habitat, where they can hunt.

Where & how competition occurs

Snow conditions vary, both seasonally and from year to year. Periods of warm and windy weather may result in hardened snow. How long the crusted snow lasts depends on location, aspect, slope, and snowfall and temperature changes. Heavy snowfalls are frequent in the northern Rockies. Compacted snow may exist regularly only where people repeatedly compact it throughout the winter.

Various reports and observations have documented coyotes using high elevation areas with deep snow (Buskirk et al. 2000a). Coyotes use open areas because the snow is more compacted there, according to research conducted in central Alberta (Todd et al. 1981). Another study in Alberta showed coyotes selected hard or shallow snow more than lynx (Murray et al. 1994). A study in eastern Canada showed much less snowshoe hare activity within 240 feet of repeatedly used snowmobile trails, with much more red fox activity (Neuman & Meriam 1972).

Related research is underway in northwestern Montana, northern Utah and north-central Washington – see Appendix F. Preliminary results from research in northwestern Montana indicates that coyotes and lynx are spatially segregated during the winter due to the availability of more abundant prey for coyotes (deer and road-killed deer) at lower elevations (Squires, pers. com. 2003). Preliminary results from studies in Utah indicate that coyotes access deep snow habitats that would otherwise be unavailable to them (Bunnell, pers. com. 2003).

At this time there is no evidence that, if competition exists between lynx and other predators, it exerts a population level threat on lynx (USDI FWS, 2003 p. 40097).

How competition may be affected by management activities

Competition risks from winter over-the-snow recreation

Winter recreation such as snowmobiling, cross-country skiing, dog-sledding and snow-shoeing compacts snow throughout the winter in some places, potentially increasing the access other predators have into lynx habitat (Halfpenney et al. 1999). These activities are increasing in lynx habitat – see the *Recreation* section later in Chapter 3.

About 13,000 miles of designated and groomed snowmobile and cross-country ski routes are in the amendment area. Of these, about 8,000 miles are in lynx

habitat. In the amendment area, there are 359 special use permits and agreements for winter activities, 94 percent in lynx habitat. These activities compact the snow and may provide access for competing predators to areas with deep snow.

Competition risks from mineral & energy development

Mining and energy development may change or eliminate lynx habitat, and can promote winter access. See the *Minerals* section later in Chapter 3. Access roads may be plowed during winter, improving access for competing predators into lynx habitat. These effects are likely to be localized since there is no information to indicate that mining or energy development poses a threat to lynx populations as a whole (USDI FWS 2000, USDI FWS, 2003).

Mineral materials (gravel, rock, sand)

About 2,600 active mineral materials pits exist in the amendment area. Of these, between two to three percent (from 50 to 80) are in lynx habitat. Pit size ranges from less than one acre up to five acres. Currently, only one has winter operations.

Locatable minerals (gold, silver, copper, etc.)

In the year 2000, 142 Plans of Operations and 550 Notices of Intent to operate were processed for the amendment area. During the last 15 years, about a third were inside lynx habitat. Most existing locatable minerals operations are less than 20 acres, although there are five operations in lynx habitat that are from 100 to 600 acres. The potential for mineral discovery in lynx habitat is considered low.

Leasable minerals

There are about 820,000 acres under lease for oil and gas, with more acres pending for lease in the amendment area. Only two wells have been drilled in lynx habitat during the past decade. Recent estimates suggest that eight more wells may be drilled. Currently, there are no pipelines in lynx habitat.

Competition risks from forest roads

Forest and backcountry roads and trails may make snow-compacting activities easier, which in turn may provide competing predators access into lynx habitat during the winter (Ruediger et al. 2000). See the *Roads* section later in Chapter 3.

Table 3-14. BA findings about whether existing plans manage snow-compacting activities

	Fully or substantially	Marginally	Does not	Unknown or n/a
FS plans (20 in amendment area)				
Winter recreation	15%	40%	40%	5%
Minerals	20%	55%	20%	- - -
Forest roads	60%	15%	25%	- - -
BLM plans (nine in amendment area)				
Winter recreation	22%	11%	67%	- - -
Minerals	- - -	- - -	100%	- - -
Forest roads	- - -	56%	44%	- - -

Competition under Alternative A, no action

Most existing plans contain limited direction about snow-compacting activities – see Table 3-14. Under the no-action alternative, management direction to conserve lynx would not be incorporated into existing plans. Existing land management direction would continue to be implemented.

Winter recreation under Alternative A
Existing management direction for over-the-snow winter recreation would continue. Grooming winter trails is likely to remain stable at current levels for at least the next five years because the amount of money for grooming is not likely to increase substantially. However, grooming may increase later in the decade to meet the continuing increase in demand if funding becomes available.

Public demand for outfitter services is likely to increase, and outfitter growth would likely follow current business trends. Outfitters have been diversifying their businesses by shifting their services to winter recreation, although the number of outfitters has remained stable during the last decade.

Existing uses may provide packed trails for other carnivores to more easily enter lynx habitat, and compete with lynx for food or prey on lynx. Under existing plans, grooming and designated routes could expand into new areas, providing additional access.

Mineral & energy development under Alternative A
There is limited mineral and energy development in lynx habitat. Access roads that are plowed in winter could also improve the access for competing predators.

Forest roads under Alternative A
About ten miles of road construction could occur in lynx habitat during the next few years – see Table 3-15. About five miles could be located on ridge-tops where lynx may travel. New road construction may provide new areas for over-the-snow winter recreation and may provide improved access to competing predators.

Competition under Alternative B

Alternative B would minimize potential risks to lynx from competing predators – see Table 2-1 in Chapter 2 for the complete text of the alternatives.

- Objective HU O1 would discourage new snow-compacting activities in lynx habitat.
- Standard HU S1 would limit increases in designated routes in an LAU.
- Standard HU S3 would restrict winter motorized access to designated routes for some activities
- Guidelines HU G4, HU G5 and HU G9 would encourage remote monitoring reclaiming sites, restricting access and decommissioning new roads

Table 3-15. Forest road management plans in lynx habitat in the amendment area

Category of road	Miles
Road construction planned during the next *five years* that could remain open	10
Roads planned on ridge tops that could remain open during the next *decade*	5

Winter recreation under Alternative B

Standard HU S1 says new routes could not be designated in an LAU, unless the designation would consolidate use and improve lynx habitat. Grooming could expand onto routes that are currently designated but not groomed. No restrictions are imposed for off-trail use.

Alternative B would limit the amount of man-caused snow compaction occurring in new areas. Standard HU S1 would limit the potential competition from other carnivores to existing areas.

Mineral & energy development under Alternative B

Standard HU S3 would restrict winter access for mineral and energy development to designated routes to help reduce snow compaction. Designating routes could benefit lynx by reducing the access competing predators have into lynx habitat.

Forest roads under Alternative B

Alternative B would provide guidance about what to consider during road construction to minimize or reduce the effects on lynx. Public access could be restricted on new roads, and new roads generally should not be built on ridge-tops.

Competition under Alternatives C & D

Alternatives C and D are similar to Alternative B for minerals and forest roads.

Winter recreation under Alternatives C and D

Standard HU S1 would increase the size of the area used to evaluate changes to groomed and designated routes, from a single LAU, to an LAU or a fixed combination of adjacent LAUs. Standard HU S1 would allow groomed and designated routes to expand into areas that are already consistently used and compacted, as identified in the baseline of areas and routes used between 1998 and 2000.

Many existing snowmobile and cross-country ski routes traverse multiple LAUs. Managing larger route systems could consolidate use and provide a more effective way to reduce or eliminate effects on lynx, and may provide a greater beneficial effect on lynx populations as a whole. However, individual lynx may be affected.

Although expansion would be allowed, routes could expand only into areas already compacted, so there would be no net change in snow compaction in an LAU. This would allow for some expansion of groomed and designated routes, while maintaining the status quo on snow compaction.

Competition under Alternative E

Alternative E would change the management direction for over-the-snow use and mineral access from standards to less restrictive guidelines. This change could allow snow compacting activities in new areas potentially affecting individual lynx that use these sites. However, these effects are likely to be localized since there is no information to indicate that over-the-snow compaction poses a threat to lynx populations as a whole (USDI FWS 2000, USDI FWS, 2003).

Mortality risk factors

Mortality risks were the second major category of risks to lynx identified in the LCAS. A *mortality risk* is something that increases the likelihood lynx will be killed.

Direct mortality can be caused by:

- Vehicle collisions on highways
- Predation by other species
- Predator control activities
- Shooting
- Trapping

Most mortality is caused indirectly by starvation from lack of prey, as discussed previously.

Vehicle collisions on highways

Major high-use highways such as I-90, I-15, US-2, US-12 and US-93 may result in lynx deaths from vehicle collisions (Ruediger et al. 2000). The effects of highways on lynx are discussed with movement risks beginning on the next page.

Predation by other species

Predation on lynx kittens by coyotes, grey wolves, mountain lions, bobcats and birds of prey has been inferred or documented throughout the range of the lynx (Ruediger et al. 2000).

Snow compacted by snowmobiling, skiing, etc., may facilitate the movement of other predators into lynx habitat (Buskirk et al. 2000a). The effects of snow compaction on lynx were previously discussed with competition risks.

Predator control, shooting & trapping

The USDA Wildlife Services traps, shoots and poisons predators on federal lands, usually on domestic livestock allotments and sometimes inside lynx habitat. While these efforts are directed at specific species or offending animals, occasionally a lynx may be affected. Wildlife Services captured and released a lynx in Idaho in 1991 but there have been no other recent reports (Ruediger et al. 2000). People on adjacent private lands may conduct similar efforts.

Lynx trapping is not permitted in any of the states in the amendment area; however, lynx may be trapped incidentally. Lynx could be shot mistakenly by legal hunters or illegally by poachers.

This amendment does not address predator control, shooting or trapping because they are outside the jurisdiction of the FS and BLM. For more discussion, see the Chapter 2 section, *Management direction considered, but not in detail.*

Movement risk factors

Risks to lynx movement were the third major category of lynx risk factors identified in the LCAS. A *movement risk* is anything that increases the likelihood lynx movements will be impeded or inhibited.

Lynx daily movements vary up to six miles. Lynx are known to regularly explore from nine to 25 miles beyond their home ranges, and to make long-distance moves of up to 600 miles when prey is scarce (Ruediger et al. 2000).

Recent genetic work has shown that lynx throughout western North America are closely related (Schwartz et al. 2002), indicating populations have been well enough connected to maintain close kinship. Lynx seem to prefer to move through continuous forest, frequently use ridges, saddles and riparian areas (Koehler 1990, Staples 1995) and have been observed to avoid large openings (Ruggerio et al. 2000a).

At this time no natural or human-caused barriers that effectively prohibit movement of lynx between Canada and the northern Rockies have been identified (USDI FWS, 2003 p 40097).

The riparian corridors required by INFISH and PACFISH provide connectivity by making continuous forest or shrub cover available (Hickenbottom et al. 1999). INFISH and PACFISH apply to amendment area NFs west of the Continental Divide and BLM lands in Idaho and Utah.

As part of their Conservation Agreements, the agencies agreed to identify linkage areas. *Linkage areas* are places that connect blocks of lynx habitat, and have been identified for Idaho, Montana, Wyoming and Utah. Federal, state and tribal governments – including highway agencies – were involved. Figure 1-1 identifies linkage areas in the amendment area; Appendix B documents the criteria used.

Movement risks

Movement risks from grazing

Livestock grazing may change, reduce or eliminate snowshoe hare habitat in quaking aspen, willows and riparian areas. In shrub-steppe habitat, grazing may change plant composition where shrubs provide cover and connectivity between blocks of lynx habitat. These effects are likely to be localized since there is no evidence grazing poses a threat to lynx populations as a whole (USDI FWS, 2003).

Movement risks from highways

Highways can alter landscapes by fragmenting large tracts of land. The degree of impact increases as highways are upgraded from two lanes. However, no information exists to determine the level that traffic volume or roadway design affects lynx (USDI FWS, 2003).

Major high-use highways such as I-90, I-15, US-2, US-12, US-95 and US-93, state highways 75 in Idaho and 83 in Montana, and US-14, US-26 and US-189 in Wyoming, may impede lynx movement across the landscape (Ruediger et al. 2000). While the FS and BLM don't have

authority over these highways, they can influence the consideration of wildlife crossings if a right-of-way is involved.

Most state transportation departments are considering ways to provide wildlife crossings during highway construction and reconstruction projects. See the transportation report in the Project Record for further detail.

Parts of US-95 in Idaho and US-2 and US-93 in Montana were rebuilt in the last decade; none of the work was done where lynx linkage areas have been identified.

Movement risks from forest roads
As the standard of road increases from gravel to two-lane highway, traffic speeds and volume increase and can affect lynx movements. During the last decade, about 15 miles of two-lane roads were paved in the amendment area. There is no evidence that lynx avoid or are displaced by unpaved roads; therefore unpaved roads are not considered a threat to lynx movement (USDI FWS 2003).

In 2001, the FS established a detailed Roads Analysis policy (36 CFR 212.5(2)) to decide which roads to keep and which to decommission. Before any road is upgraded, a Roads Analysis must be completed. Lynx needs would be considered as part of this analysis.

Movement risks from land ownership patterns
Private land development, especially four season resorts and developments along road corridors in mountain valleys, may fragment habitat and impede lynx movement (Ruediger et al. 2000).

Movement risks from recreation
Winter developed recreation
Downhill and cross-country ski areas represent only a small fraction of lynx habitat – less than 30,000 of 18.5 million acres in the amendment area – but their location on north facing slopes, high seasonal and year-round use and associated developments may affect lynx movement (Ruediger et al. 2000). There are 18 downhill ski areas in lynx habitat in the amendment area.

Table 3-16. BA findings about whether existing plans manage habitat connectivity

	Fully or substantially	Marginally	Does not	Unknown or n/a
FS plans (20 in amendment area)				
Connectivity	40%	50%	10%	- - -
Coordinating connectivity & land adjustments	20%	60%	20%	- - -
Land adjustments	- - -	50%	50%	- - -
Developed recreation‡	5%	- - -	95%	- - -
BLM plans (nine in amendment area)				
Connectivity	22%	78%	- - -	- - -
Coordinating connectivity & land adjustments	- - -	78%	22%	- - -
Land adjustments	- - -	67%	33%	- - -
Developed recreation †	- - -	11%	78%	11%

†Year-round developed recreation was evaluated in the BA

A survey of two ski areas in southern Canada showed that skiers did not seem to keep lynx from occupying and using the areas, and that lynx did not always run away from people (Creel et al. 2002). However, what level of human presence lynx can tolerate has not yet been determined (Roe et al. 2000).

Dispersed recreation
It's unlikely that spring, summer or fall recreation sites, such as campgrounds, affect lynx because lynx appear to exhibit a low susceptibility to displacement by humans, even though there's probably some level of activity that would cause lynx to move. Lynx also have more foraging opportunities during these seasons. It's possible lynx could be displaced by activity near denning sites (Ruediger et al. 2000). No management direction was developed for spring, summer or fall recreation because of the low likelihood of conflicts. Therefore, it's not discussed further.

Movement risks under Alternative A, no action

Under the no-action alternative, management direction for the conservation of lynx would not be incorporated into existing plans. The existing direction would continue.

Highways under Alternative A
Two highways in linkage areas could be expanded from two to four lanes during the next decade – US-95 in Idaho and US-30 in Wyoming. Wildlife crossings are being considered for these upgrades even though existing plans do not require them.

Roads under Alternative A
About 45 miles of two-lane roads on NF lands are planned for paving during the next decade – see Table 3-17. Existing plans contain no requirements to consider wildlife crossings, but a Roads Analysis would have to be done to consider resource needs before upgrading. If wildlife crossings are not incorporated, lynx movement could be negatively affected by increasing the speed and traffic volumes on these roads. About 240 miles of road are planned for upgrading. Upgrading could increase traffic speeds and volumes, although not to the same degree as paving.

Land ownership under Alternative A
Existing plans require considering the effects on threatened and endangered species in land ownership adjustments.

About 375,000 acres may be considered for acquisition in the amendment area during the next decade. Many acres are in lynx habitat or linkage areas. Acquiring these lands would improve federal landownership patterns.

It's also possible that when acquiring desirable lands, some lynx habitat or linkage areas could be disposed of, which could negatively affect lynx habitat connectivity in some situations.

Table 3-17. Forest road management plans in lynx habitat

Category of road	Miles
Two or more lanes, planned to be paved during the next *decade*	45
Roads planned to be upgraded during the next *five years*	240

Winter developed recreation under Alternative A
Twelve downhill ski areas have expansions planned during the next decade. One new ski area is being considered. Potential developments and expansions could result in losing habitat. Habitat fragmentation may increase and could impede the movement of lynx across the landscape.

Movement risks under Alternatives B, C, D & E

Grazing
Standard LINK S2 says to manage livestock grazing in shrub steppe habitat to provide cover and connectivity between blocks of lynx habitat.

Under Alternative E, standard LINK S2 is changed to a less restrictive guideline LINK G2. This change could result in some local reduction of cover and connectivity and may affect an individual lynx that is moving between blocks of lynx habitat. However, there is no evidence that grazing affects lynx populations as a whole (USDI FWS, 2003). This localized effect would most likely be located on the east side of the northern Rockies because direction included in the INFISH and PACFISH amendments require protection of riparian areas. Riparian areas are often used by lynx for travel.

Roads and highways
- *Objectives ALL O1, HU O6* and *LINK O1* describe project design that considers how to maintain and provide for connectivity
- *Standards ALL S1, LINK S1* are discussed below. *Guideline ALL G1* requires project planners to consider using techniques to avoid or reduce adverse effects on lynx during highway construction and reconstruction
- Under Alternative B, *Guideline HU G6* discourages upgrading roads in lynx habitat where the result would be increased traffic volumes or speeds
- Under Alternatives C, D and E, *Guideline HU G6* says mitigation to maintain lynx movement corridors should be considered when upgrades result in increased traffic volumes or speeds

Currently, wildlife needs are frequently considered in road and highway development. Adding Guidelines ALL G1 and HU G6 to existing plans would make sure they were considered.

Standards ALL S1 and LINK S1 should reduce the effects of habitat fragmentation from roads and highways, and provide for the movement and dispersal of lynx throughout the amendment area.

Land ownership under Alternatives B, C, D & E
- Objective LINK O1 encourages the agencies to work with other landowners to find ways to reduce the potential for adverse effects in linkage areas
- Guideline LINK G1 encourages the agencies to retain habitat in linkage areas

Alternatives B, C, D and E should reduce habitat fragmentation from private land development and patterns of scattered land ownership, and enable lynx to move and disperse throughout the amendment area.

Winter developed recreation under Alternatives B, C, D & E

- Objectives ALL O1, HU O2, HU O3 and HU O4 encourage maintaining or restoring lynx connectivity
- Standard ALL S1 requires new or expanded permanent developments to maintain connectivity

Under Alternative B, Standard HU S2 requires lynx diurnal security habitat to be provided where needed, although it's not found lacking everywhere. Under Alternatives C, D and E, this direction is changed to a guideline.

- Guidelines HU G2 and HU G3 say lynx movement must be considered when designing developed recreation sites

These objectives, standards and guidelines do not prohibit new developments or prohibit expanding existing developments. However, they do require considering lynx needs in facility design and operations. As a result, habitat connectivity would be provided in new or expanded operations, and lynx would more likely be able to use these areas and move unimpeded throughout the landscape under Alternatives B, C, D and E.

Standard ALL S2

Alternative D

Alternative D contains Standard ALL S2 that would allow a project to deviate from one or more lynx standards if a determination of "not likely to adversely affect" lynx has been made, subject both to ESA requirements and to approval by the BLM state director or Regional Forester – see Table 2-1. The use of the standard would be monitored.

The BO says,

> *... for most agency actions, noncompliance with the standards in the LCAS increases the likelihood that actions would adversely affect lynx.*

Possible effects include:

- Some projects may result in improving or maintaining winter snowshoe hare habitat over the long term
- Mandatory standards might not be implemented as intended, or standards might be applied less consistently throughout the amendment area because of the many administrative jurisdictions and field offices
- Standard ALL S2 provides a less reliable regulatory mechanism because of the uncertainty of its application
- It may be more difficult to determine cumulative effects at the project level for larger scales such as metapopopulations

Alternative E

Alternative E also contains Standard ALL S2. Under Alternative E, Standard ALL S2 would allow a project to deviate from one or more lynx standards if the project has short-term adverse effects on lynx, as long as it has long-term benefits to lynx and its habitat, subject to ESA requirements but without a higher level of review. The use of the standard would be monitored, as with Alternative D.

The possible effects are similar to those described under Alternative D, plus:

- Projects would have adverse effects on lynx and require formal consultation with FWS
- Given the current state of knowledge, it may be difficult to determine where, when and how short-term adverse effects could be offset by long-term improvements in lynx habitat, both inside an LAU and over larger scales
- Short-term adverse effects on individual lynx could occur, because projects with short-term adverse effects could be concentrated in one LAU and combined with projects with long-term benefits in other LAUs
- The lack of higher-level review may lead to a greater degree of inconsistency in how standards are applied

Effects summary

Table 3-18 summarizes how the alternatives address lynx risk factors.

Alternative A

There would be no change in management direction under Alternative A. Consequently, there would be no change in effects from those identified in the BA for existing plans.

The quantity and quality of winter snowshoe hare foraging habitat would likely decline due to the lack of management direction to:

- Provide a distribution of age classes
- Restrict activities that reduce winter snowshoe hare forage
- Promote actions that create forage where it's lacking

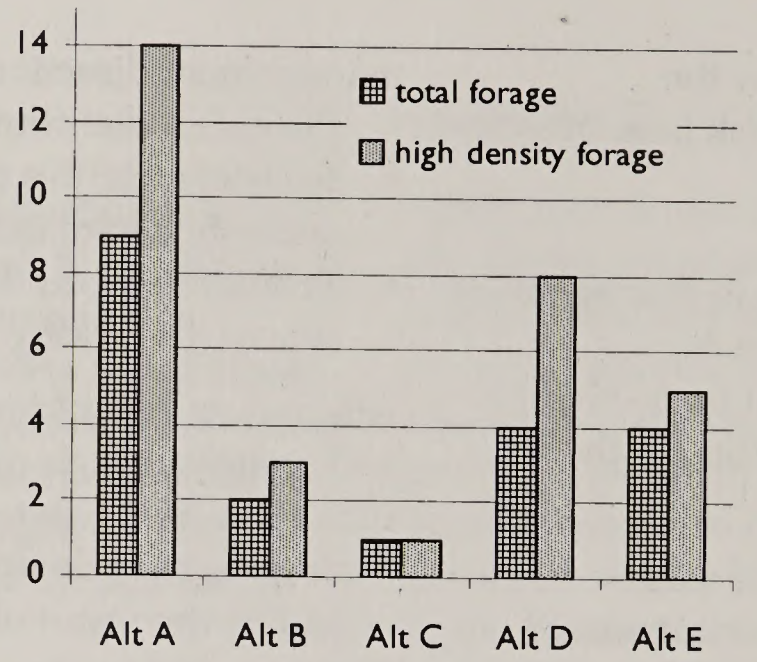
Alternative A could reduce the quantity and quality of high-density winter snowshoe hare habitat by 14 percent during the next decade. The reduction would be the result of precommercial thinning, fuel treatment and whitebark

Table 3–18. How the alternatives address the LCAS risk factors

	Alt A	Alt B	Alt C	Alt D	Alt E
Incorporates regulatory mechanisms	N	Y	Y	P	P
Risk factors relating to quantity & quality of foraging habitat					
Direction limits amount of unsuitable habitat	N	Y	P	P	P
Direction limits timber harvest creating unsuitable habitat	N	Y	P	N	N
Direction limits PCT in foraging habitat	N	Y	Y	P	P
Direction limits other vegetation projects in foraging habitat	N	N	Y	P	P
Direction for fire	N	Y	Y	Y	Y
Direction addresses grazing	P	Y	Y	Y	P
Risk factors relating to quantity & quality of denning habitat					
Direction retains ten percent denning habitat	P	Y	Y	Y	P
Direction defers management activities in potential denning habitat	N	Y	Y	P	P
Direction limits salvage of small areas of dead/dying trees	N	Y	Y	P	P
Risk factors relating to competition from predators					
Direction for over-the-snow winter recreation	N	Y	P	P	P
Direction for ski areas	N	Y	Y	Y	Y
Direction for minerals and energy development	N	Y	Y	Y	P
Direction for roads	P	Y	Y	Y	Y
Risk factors relating to movement & connectivity					
Direction for highways	N	Y	Y	Y	Y
Direction for land acquisition	N	Y	Y	Y	Y
Direction for connectivity	P	Y	Y	Y	Y

N = No management direction or only very limited direction included
P = Partial, some management direction exists or would be included to limit or avoid some effects caused by the risk factor
Y = Yes, includes enough management direction to limit or avoid effects caused by the risk factor

Figure 3-5. Percent of winter snowshoe hare habitat affected by the alternatives



pine restoration. Winter snowshoe hare habitat in young regenerating forests could be reduced by almost one-quarter if all acres were thinned. Considering both low- and high-density forage, then only about nine percent could be reduced – see Figure 3-5.

An adequate amount of denning habitat may not be provided on those units that lack management direction to provide old growth or coarse woody debris. Denning habitat would likely be reduced in some places.

Existing plans would allow snow compacting activities to occur in new places, expanding the area where competition with other predators may occur. This expansion could affect individual lynx; however there is no evidence that if competition exists between lynx and competitors that it affects lynx at a population level (USDI FWS 2003).

Lynx movement may be restricted due to lack of management direction to provide habitat connectivity. No direction would be provided for:

- Managing roads, highways and development, or
- Managing grazing to provide cover, such as in riparian areas

Those plans already amended by PACFISH and INFISH would provide for lynx movement to some degree. Grazing in areas where plans have not been amended by PACFISH and INFISH may affect lynx in local areas by reducing habitat cover but there is no evidence that grazing poses a threat to lynx populations as a whole.

In summary, since specific management direction that address threats to lynx populations (specifically direction for timber harvest, thinning and fire suppression) is lacking in existing plans, adverse effects on lynx populations would continue. The plans also lack

management direction in some areas for grazing, minerals, roads and over-the-snow use; however, these specific risks are likely to only affect individual lynx, not populations as a whole.

Alternative B

Alternative B would incorporate management direction into existing plans to reduce or eliminate almost all known adverse effects on lynx populations and individuals and contribute to conserving the species.

Alternative B would result in improved forage habitat for lynx in young regenerating forests. Alternative B would add management direction to:

- Provide a distribution of age classes
- Restrict precommercial thinning
- Promote actions that create forage where it's lacking

Alternative B would restrict precommercial thinning, the major activity that occurs in young regenerating forests, but does not restrict it in multistoried forests. Alternative B could reduce the quantity and quality of high-density winter snowshoe hare forage by three percent during the next decade, primarily the result of fuel treatments and whitebark pine restoration in multistoried forests – see Figure 3-5. Only a limited reduction would occur in young regenerating forests, since most precommercial thinning is restricted. Considering both low- and high-density forage, then about two percent could be affected.

Alternative B would incorporate management direction for denning habitat that would protect denning habitat and den sites.

Grooming would not be allowed to expand beyond existing designated routes, and designated over-the-snow routes would not be allowed to expand into new areas. Competing predators would be limited to existing compacted areas, until more information about the effects of competitors using compacted trails can be gathered and analyzed. Alternative B would limit the potential effect on individual lynx.

Lynx habitat connectivity would be improved by providing management direction to retain cover adjacent to riparian areas and to coordinate with other landowners.

In summary, management direction to address threats to lynx populations, specifically direction for timber harvest and thinning, would be incorporated into existing plans, but multistoried foraging habitat still could be reduced.

Alternative B also would add management direction for grazing, minerals, roads and over-the-snow use which would minimize potential effects of these activities on individual lynx.

Alternative C

Alternative C also would incorporate management direction to reduce or eliminate adverse effects on lynx and contribute to conserving the species.

Alternative C would result in improved winter snowshoe hare habitat by adding management direction to:

- Provide a distribution of forest age classes
- Restrict most vegetation management projects in forage habitat
- Promote actions that create forage where it's lacking in young regenerating forests

Less than one percent of winter snowshoe hare habitat in young regenerating and multistoried forests could be reduced during the next decade by the activities allowed by Standards VEG S5 and S6 – see Figures 3-3 and 3-4.

Alternative C would expand the area to which Standard VEG S1 is applied, to a fixed combination of adjacent LAUs, to better reflect historic disturbance patterns. This may affect individual lynx because every forest age class may not be represented in a single LAU, but also may result in a long-term beneficial effect on overall populations because it would better reflect historic disturbance patterns.

Changing Standard VEG S2 to a guideline would provide direction to consider the amount of timber harvest that could create unsuitable habitat, even though timber harvest rarely creates an overabundance of unsuitable habitat (Hillis et al. 2003).

Alternative C would incorporate direction for denning habitat that would protect denning habitat and den sites.

Alternative C would incorporate direction for snow compaction. Standard HU S1 also would be applied to multiple LAUs, and would allow grooming and designated routes to expand into places already compacted. Alternative C would not directly result in new places with human-compacted snow.

Alternative C would incorporate direction for habitat connectivity.

In summary, Alternative C would add management direction to address threats to lynx populations, specifically direction for timber harvest and thinning. However the analysis size for considering unsuitable habitat would be expanded, which could affect individual lynx, but may be beneficial for the population as a whole. Nearly all the winter snowshoe hare habitat would be protected.

Alternative C also adds management direction for grazing, minerals, and roads which would minimize potential effects of these activities on individual lynx. The analysis boundary for over-the-snow use would be expanded which could affect some individual lynx.

Alternative D

Alternative D would incorporate management direction to reduce or eliminate many adverse effects on lynx and contribute to conserving the species.

Alternative D would add direction to distribute forest age classes, but under Standard VEG S1 expands the size of analysis area even more to allow considering historic disturbance patterns. This change could result in adverse effects on individual lynx, but is likely to provide long-term beneficial effects on lynx populations as a whole.

Alternative D could reduce the amount of quality winter snowshoe hare foraging habitat compared to Alternatives B and C

because Standards VEG S5 and VEG S6 allow more activities in hare habitat. During the next decade, Alternative D could reduce the amount of quality forage by eight percent as a result of precommercial thinning and whitebark pine restoration – see Figure 3-5.

About 15 percent of the winter snowshoe hare habitat in young regenerating forests could be affected by precommercial thinning, assuming thinning always reduced habitat quality regardless of the thinning prescription. Considering both low- and high-density forage, about four percent could be affected, which could adversely affect lynx.

Alternative D provides direction to retain denning habitat – but changing Standard VEG S4 to a guideline could result in reducing the number of potential den sites.

Alternative D adds management direction for habitat connectivity.

In summary, Alternative D would add management direction to address threats to lynx populations, specifically direction for timber harvest and thinning. However some adverse effects would be allowed to occur. The analysis size for considering unsuitable habitat would be expanded which could affect individual lynx, but may be beneficial for the population as a whole. The quality and quantity of winter snowshoe hare habitat could be reduced by about seven percent.

Alternative D also adds management direction for grazing, minerals, and roads which would minimize potential effects of these activities on individual lynx. The analysis boundary for over-the-snow use would be expanded which could affect some individual lynx.

Alternative E

Alternative E would incorporate management direction to reduce or eliminate many adverse effects on lynx and contribute to conserving the species.

Alternative E would add direction to distribute forest age classes, but under Standard VEG S1 expands the size of analysis area to allow considering historic disturbance patterns. This change could result in adverse effects on individual lynx, but is likely to provide long-term beneficial effects on lynx populations as a whole.

Alternative E could reduce high-density winter snowshoe hare habitat by five percent as a result of fuel treatment and whitebark pine restoration – see Figure 3-5. Considering both low- and high-density winter snowshoe hare habitat, then about four percent would be affected, which could adversely affect lynx. Some fuel treatments may result in long-term adverse effects if the structure and composition of vegetation is changed over the long term.

Alternative E provides direction to retain denning habitat – but changing Standard VEG S4 to a guideline could result in a reduced number of potential den sites.

Alternative E would permit short-term adverse effects ton lynx, but only if there are long-term beneficial effects.

In summary, Alternative E would add management direction to address threats

to lynx populations but would allow some adverse effects to occur. The analysis size for considering unsuitable habitat would be expanded, which could negatively affect individual lynx but may be beneficial for the population as a whole. The quality and quantity of winter snowshoe hare habitat could be reduced by about five percent due to allowing fuel treatment and whitebark pine restoration activities to occur in winter snowshoe hare habitat.

Alternative E also adds management direction for grazing, minerals, and roads which would reduce potential effects of these activities on individual lynx. The management direction is changed from standards to less restrictive guidelines which could affect individual lynx if the guidelines are not followed; however this change would not affect lynx populations since these risks have been determined to not threaten the overall population of lynx.

Cumulative effects

Alternative A

Management actions allowed by existing plans in the developmental land allocations on federal lands have the potential to adversely affect lynx (Hickenbottom et al. 1999). Similarly, management practices on state, corporate and small private lands may present a risk to lynx persistence in the long term. Preliminary research conducted on privately-owned corporate timber lands in northwestern Montana show that such lands provide varying levels of snowshoe hare densities (abundant to low), depending on the timber harvest regime (USDI FWS, 2003).

The presence of major highways through the area, several large reservoirs and residential and urban development pose movement obstacles.

Management direction incorporated through the PACFISH and INFISH amendments, the OHV (off-highway vehicle) amendment, Healthy Forest Rangeland Initiative and Roadless Policy provides improved habitat conditions for lynx – see Appendix L. The two large national parks, Glacier and Yellowstone, provide large secure blocks of habitat.

Cumulatively, the past, present and reasonably foreseeable programmatic actions described in Appendix L would generally improve habitat conditions for lynx. However, since existing plans would still lack management direction to reduce threats to lynx, adverse effects would continue.

Alternatives B, C, D & E

The action alternatives would incorporate management direction – to varying degrees – that would reduce or eliminate adverse effects from management actions in the amendment area. However, Standard ALL S2 in Alternative E would permit short term adverse effects as long as there are long term beneficial effects.

Management direction would result in improved lynx habitat and connectivity. Cumulatively, this direction would have some beneficial effects on lynx. Activities on corporate and small private lands could still adversely affect lynx; however, the amendment requires considering activities on private land when evaluating the effects of projects on federal land.

Northern Rockies Geographic Area

Several NFs and BLM units in the geographic area are not included in this amendment. Some are currently revising their plans and would incorporate management direction for lynx. Others will be revising or amending plans in the near future and are considering the LCAS during project analysis – see Appendix D. The new direction should result in improved lynx habitat conditions.

United States

A similar amendment is going on in the Southern Rockies Geographic Area. Units in other geographic areas will amend or revise their plans in the next several years to incorporate lynx management direction. As these plans are updated, they should result in cumulative beneficial effects on lynx.

Other wildlife & fish

TEP species

Lists of TEP (threatened, endangered and proposed) species for FS and BLM lands that overlap lynx habitat were compiled – see Appendix H. Table 3-19 identifies the TEP species that may be affected by the amendment.

The website http://www.natureserve.org/explorer/ (NatureServe version 1.6) was used to evaluate whether the habitats of TEP species overlap lynx habitat. This website provides comprehensive information about almost all species, including habitat relationships.

The habitats of southwestern willow flycatcher, bald eagle and mountain plover overlap lynx habitat. These species would not be affected by the proposed amendment or alternatives because the proposed standards and guidelines don't affect their habitat. Therefore, these species are not discussed further.

Alternative A, no action

The no-action alternative includes the direction in existing plans. Alternative A would add no new management direction to conserve lynx.

Indirect effects on TEP species

There would be no change in effects on fish and wildlife resources from those of existing plans. Management area objectives, and standards and guidelines would remain unchanged.

Table 3-19. TEP species that could be affected by Northern Rockies lynx amendment

Mammals	Birds	Fish
Threatened		
Canada lynx †	Mexican spotted owl	Bull trout ‡
Grey wolf ‡		Chinook salmon
Grizzly bear ‡		Steelhead trout
Endangered		
Grey wolf ‡		Bonytail chub
Woodland caribou ‡		Colorado squawfish
		Humpback chub
		Kendall Warm Springs dace
		Razorback sucker
		Sockeye salmon
		White sturgeon

†For species in **bold**, effects may be **beneficial**.
For all other species, the overall effects may be both beneficial and detrimental.
‡ MIS (management indicator species) on some units

Alternatives B, C, D & E

Alternative B, the Proposed Action, would add management direction for lynx about:

- Vegetation management
- Winter snowshoe hare habitat
- Lynx denning habitat
- Livestock grazing
- Winter recreation
- Minerals and energy exploration and development
- Roads and highways

Alternatives C, D and E add similar management direction with some variations. The effects of the alternatives on other TEP species are discussed below.

TEP mammals

Woodland caribou

Woodland caribou is an endangered species on the Idaho Panhandle NF in northern Idaho. Caribou are generally found above 4,500 feet elevation in mature and old growth Engelmann spruce/subalpine fir and western red cedar/western hemlock forests.

Amendment direction for vegetation management, denning habitat, livestock grazing, mineral and energy exploration and development, and roads and highways is likely to be beneficial or neutral to caribou. The proposed direction would generally reduce disturbance, or maintain current levels.

Standards VEG S5 and VEG S6 under Alternatives B, C and D, and Guideline VEG G8 under Alternative E, may have both beneficial and adverse effects on caribou. The activities these standards limit in winter snowshoe hare habitat would result in reduced disturbance. Limiting precommercial thinning could result, on a few acres, in delaying the growth of the mature forests that caribou rely on. These effects would take place only where vegetation management actions were deferred. Alternatives B and C would have similar effects; Alternatives D and E would allow some activities to take place.

Grey wolf & grizzly bear

Efforts to recover *grey wolf* populations include different approaches in different places. The wolves that naturally re-colonized in northwest Montana and in Idaho north of Interstate 90 are a fully protected endangered species, but the reintroduced wolves in the Greater Yellowstone area and central Idaho are designated as nonessential experimental populations.

Grizzly bears are a threatened species in four ecosystems – the Selkirk in northern Idaho, the Cabinet-Yaak in northwestern Montana and northern Idaho, the Northern Continental Divide in western Montana, and the Yellowstone in southwestern Montana and portions of Wyoming and Idaho.

All alternatives, to different degrees, may beneficially affect both grizzly bears and grey wolves by maintaining riparian habitat, reducing the disturbance associated with minerals and human uses, reducing habitat fragmentation and providing for animal movement.

Grey wolves may benefit from the guidance to retain foraging habitat for snowshoe hare.

Standards VEG S5 and VEG S6 could reduce the forage available for bears and big game, the wolves' primary prey, by limiting the growth of grasses, forbs and shrubs. Alternatives D and E would allow some vegetation management to occur in winter snowshoe hare habitat, so would not reduce the forage as much as Alternatives B or C.

TEP birds

Mexican spotted owl

Mexican spotted owls are a threatened species found on the Ashley NF in Utah. Dead and down timber is an important part of their habitat. Standard VEG S4 under Alternatives B and C, and Guideline VEG G7 under Alternatives D and E could result in retaining more dead and down material than existing plans.

The owls feed and nest in multistoried forests. Disturbance is important to multistoried forests – see the *Forests* section for a discussion of how disturbance changes forests. Standard VEG S6 would limit disturbance under all alternatives because it would prohibit vegetation management projects in multistoried forests. Eliminating vegetation management projects may slightly reduce the amount of feeding and nesting habitat over the long term.

Alternatives D and E would allow vegetation management projects that would help maintain multistoried conditions, so they would have less effect on the owls than Alternatives B or C.

TEP fish

Ten threatened or endangered fish occur in the amendment area – see Appendix H. The alternatives propose roads guidelines that could affect fish. Guideline HU G6 could increase the sediment delivered to streams if it limits paving and Guideline HU G7 if it results in roads on side-slopes. However, guidelines can be deviated from if reasons exist. During the next five years, paving is planned for only two miles of road, and road construction on ridge-tops is planned for only seven miles. Therefore, the effect of these guidelines is negligible.

The alternatives propose management direction for livestock grazing similar to the PACFISH and INFISH direction amended into the existing plans of most units west of the Continental Divide. For units east of the Continental Divide whose plans do not contain similar direction, adding this grazing direction may beneficially affect fish by managing riparian-area grazing to achieve conditions similar to historic.

Sensitive species

For the FS, a *sensitive species* is one designated by the Regional Forester because of concern about the viability of its population as evidenced by significant current or predicted downward trends:

- In population numbers or density
- In habitat capability that may reduce an existing species' distribution

For the BLM, a *special status species* is one designated by the State Director and the director of the state's fish & wildlife agency when a native species population:

- Is small and widely dispersed
- Is in immediate danger of extinction or extirpation, or its distribution is in danger of becoming significantly reduced; or
- Lives in ecologically unique places

Although neither of these designations is covered under ESA, management direction is provided by FS policy in FS Manual 2670 and BLM policy in BLM Manual 6840.

Lists of sensitive species for FS and species of special concern for BLM lands were compiled where they overlap lynx habitat

Table 3-20. Sensitive species that could be affected by the proposed lynx amendment

Mammals	Birds	Fish	Amphibians
Dwarf shrew †	Boreal owl ‡	Artic grayling ‡	**Boreal toad**
Fisher ‡	Great grey owl ‡	Colorado River cutthroat trout ‡	**Northern leopard frog**
Marten ‡	Merlin	Interior redband trout	
Wolverine ‡	Northern goshawk ‡	Ling	
	Olive-sided flycatcher	Sicklefin chub	
	Swainson's thrush	Snake River cutthroat trout ‡	
	Black-backed woodpecker ‡	Sturgeon chub	
	Red-naped sapsucker	Torrent sculpin	
	Three-toed woodpecker ‡	West slope cutthroat trout ‡	
	Williamson's sapsucker ‡	Yellowstone cutthroat trout	
	White-headed woodpecker		
	Golden-crowned kinglet		
	Hammond's flycatcher		

†For species in **bold**, effects may be **beneficial**; for species in *italics*, effects may be *detrimental*. For all other species, the overall effects may be both beneficial and detrimental.
‡ MIS species on some units

Table 3-21. Sensitive species not affected, but with habitat in the amendment area

Mammals	Birds	Amphibians & reptiles	Invertebrates
Bighorn sheep ‡	Peregrine falcon ‡	Coeur d'Alene salamander	Regal frittilary
Northern bog lemming ‡	Baird's sparrow	Spotted frog ‡	Tawny crescent butterfly
Spotted bat	Common loon ‡	Wood frog	
Townsend's big-eared bat	Flammulated owl ‡		
Water vole	Fox sparrow		
	Golden eagle ‡		
	Harlequin duck ‡		
	Loggerhead shrike		
	Mountain plover		
	Mountain quail		
	Pygmy nuthatch ‡		
	Trumpeter swan		

‡ MIS species on some units

– see Appendix H. Table 3-20 lists the sensitive species that may be affected by the proposed amendment; the effects are discussed below. Other species are not affected by the amendment because their habitat would not be affected, so they are not discussed further – see Table 3-21.

Alternative A, no action

Alternative A, the no-action alternative, would add nothing to existing plans.

Indirect effects on sensitive species

Alternative A would not change the effects on fish and wildlife from those of the existing plans.

Alternatives B, C, D & E

Sensitive mammals

Fisher, martin & wolverine

Wolverines may benefit from Standard HU S1 that limits over-the-snow use in new areas and from Standard HU S3 and Guidelines HU G3 and HU G9 that result in reducing disturbance. Wolverines may also benefit from Standard VEG S4 that retains dead and down material. Standards VEG S5 and VEG S6 under Alternatives B, C and D, and Guideline VEG G8 under Alternative E, would maintain dense stands for the prey species *martens, fishers* and wolverines rely on. Deferring vegetation management activities in winter snowshoe hare habitat would reduce the amount of human disturbance in some areas, which may also benefit wolverines.

However, deferring activities until winter snowshoe hare habitat is no longer provided could delay the development of mature stands, affecting when mature stands would be available. Even so, fire, and insects and disease would continue to suppress or kill some trees, releasing the growth of others to mature into large trees – see the *Forests* section later in Chapter 3.

Alternatives B and C would have similar effects. Alternative D would allow vegetation management under certain conditions that could result in more stands growing into mature, large trees.

Under Alternative E, fuel treatments would be allowed under Standard VEG S5, and Standard VEG S6 is dropped and replaced by Guideline VEG G8. Prey species that rely on dense stands may not be as abundant if fuel treatments reduce habitat density. It's likely that not all winter snowshoe hare habitat would be treated. Based on the projected annual fuels program, about five percent of winter snowshoe hare habitat may be reduced under Alternative E.

Dwarf shrew

Dwarf shrew use dead and down trees and logs for feeding and nesting. Standard VEG S4 under Alternatives B and C, and Guideline VEG G7 under Alternatives D and E, would result in retaining more dead and down timber than the existing plans. Therefore, the action alternatives may benefit shrews.

Sensitive birds

Sensitive bird species would be affected mostly by vegetation management direction about retaining dead and down trees and the activities allowed in winter snowshoe hare habitat.

Black-backed woodpeckers, red-naped sapsuckers, three-toed woodpeckers, Williamson's sapsuckers and *white-headed woodpeckers* all feed on the insects and nest in the cavities found in dead and dying trees. Standard VEG S4 under Alternatives B and C, and Guideline VEG G7 under Alternatives D and E, would result in retaining more dead and down timber than the existing plans. Any increase in disease or tree mortality would be good for woodpeckers and sapsuckers. Therefore, the action alternatives may benefit them.

Habitat may be reduced for *golden-crowned kinglets* and *Hammond's flycatchers*. These species use older mature forests. Management direction that results in delaying the growth of mature stands, such as Standard VEG S5 may affect these species. However, it's unlikely maturity would be delayed everywhere vegetation management was deferred, because fire, and insects and diseases still would still take place.

Standards VEG S4 and VEG S5 could either retain or decrease habitat for *boreal owls, great grey owls, merlins, northern goshawks* and *olive-sided flycatchers*. These birds use dead and down trees as nesting sites, and the trees provide habitat for the small mammals on which they prey.

Standard VEG S4 or Guideline VEG G7 would retain more dead and down habitat than existing plans. Standard VEG S4 could decrease the amount of older forested habitat due to increased mortality from insects and disease. However, it's likely the decrease would be minimal since the standard applies only to areas smaller than five acres that have been disturbed by fire or insect and disease.

Standard VEG S5 would retain the dense regenerating stands that provide habitat for prey species and could delay the development of mature forests. This may affect birds that use these stand conditions.

Swainson's thrush may be affected by the direction in Standard VEG S6 that would prohibit vegetation management projects

in multistoried stands. Multistoried stands need disturbance to remain multistoried. Limiting all vegetation management may reduce the amount of feeding and nesting habitat available over the long term. This species also may benefit from maintaining a dense understory. Alternatives B, D and E would allow vegetation management projects to help maintain multistoried conditions; therefore, they would have less effect than Alternative C.

Under Alternative E, Standard VEG S6 is dropped and replaced by Guideline VEG G8. This would allow more activities to take place that may result more open, forested areas. This could reduce habitat quality for Swainson's thrush on treated acres.

Sensitive amphibians

Boreal toad and *northern leopard frog* may be affected by road Guidelines HU G6 and HU G7. These guidelines could limit paving and would recommend building roads on side slopes, which may result in increased sediment delivered to streams. However, little paving or road construction is planned in the amendment area, so the effect likely would be negligible.

Grazing standards may beneficially affect amphibians by managing livestock grazing in riparian areas.

Sensitive fish

Ten sensitive fish species occur in the amendment area. The effects on sensitive fish are the same as those described for TEP fish.

MIS species

Table 3-22. MIS species that could be affected by the proposed lynx amendment

Mammals	Birds	Fish	Invertebrates
Beaver †	**Blue grouse**	Bonneville cutthroat trout	Macro invertebrates
Black bear	**Downy woodpecker**	Brook trout	
Bobcat	**Hairy woodpecker**	Cutthroat trout	
Elk	**Mountain bluebird**	Large mouth bass	
Moose	**Northern flicker**	Rainbow trout	
Mule deer	Pileated woodpecker	Sculpin	
Red squirrel	**Red-breasted nuthatch**	Trout	
White-tailed deer	**Ruby-crowned kinglet**		
	Three-toed woodpecker		
	Willow flycatcher		
	Yellow bellied sapsucker		
	Yellow warbler		

†For species in **bold**, effects may be **beneficial.**
For all other species, the overall effects may be both beneficial and detrimental.

MIS (management indicator species) are managed under the authority of NFMA. There is no similar requirement for the BLM. MIS are listed in existing plans; Appendix I identifies MIS that overlap lynx habitat.

Several MIS species are also TEP or sensitive species, as noted with a "‡" in Tables 3-19, 3-20 and 3-21. Those species have been discussed previously and will not be discussed further.

Table 3-22 lists the MIS species that may be affected by the proposed amendment; the effects are discussed below. Other species are not affected by the amendment because their habitat would not be affected, so they are not discussed further – see Table 3-23.

Table 3-23. MIS (not TEP or sensitive) <u>not</u> affected, but with habitat in amendment area

Mammals	Birds	
Montane vole	Belted kingfisher	Ruffed grouse
Mountain goat	Brewer's sparrow	Rufus-sided towhee
Mountain lion	Lark sparrow	Sage grouse
Water shrew	Lincoln's sparrow	Vesper sparrow
Western jumping mouse	Northern oriole	Warbling vireo
	Ovenbird	White-crowned sparrow
	Prairie falcon	White-tailed ptarmigan

Alternative A, no action

Alternative A, the no-action alternative, would add no new management direction for lynx to existing plans.

Indirect effects on MIS species
Alternative A would not change the effects on fish and wildlife from those described in the existing plans.

Alternatives B, C, D & E

MIS mammals
Black bear
Some standards may beneficially affect *black bears* by retaining winter snowshoe hare habitat, which may provide for prey, retain denning habitat, maintain riparian habitat, reduce the disturbance associated with minerals, reduce habitat fragmentation and help provide for animal movement.

Standards VEG S5 and VEG S6 under Alternatives B, C and D, and Guideline VEG G8 under Alternative E, could reduce the forage available to bears by limiting the growth of grasses, forbs and shrubs. Alternatives D and E would allow some vegetation management to occur in winter snowshoe hare habitat; therefore, they would not reduce bear forage as much as Alternatives B or C.

Elk, mule deer, white-tailed deer & moose
Some standards may beneficially affect big game by retaining winter snowshoe hare habitat, which may provide hiding cover, maintain riparian habitat, reduce the disturbance associated with minerals, reduce habitat fragmentation and help provide for animal movement.

Standards VEG S5 and VEG S6 under Alternatives B, C and D, and Guideline VEG G8 under Alternative E, could reduce the forage available for *elk, mule deer* and *white-tailed deer* by limiting the growth of grasses, forbs and shrubs; however, these standards maintain hiding cover. Alternatives D and E would allow some vegetation management to occur in winter snowshoe hare habitat, and therefore would not reduce forage as much as Alternatives B or C.

Bobcat
All alternatives may beneficially affect *bobcats* by retaining winter snowshoe hare habitat, maintaining riparian habitat, reducing habitat fragmentation and providing for animal movement.

Beaver
All alternatives may beneficially affect *beaver* by maintaining riparian habitat.

Red squirrel
Red squirrels are an alternate prey for lynx. All alternatives may beneficially affect red squirrels.

Standard VEG S3 could result in retaining mature forests, red squirrel habitat.

Standard VEG S4 in Alternatives B and C, and Guideline VEG G7 in Alternatives D and E, would add management direction to retain the dead and down trees found in small patches.

Standards VEG S5 and VEG S6 could delay the development of mature trees or result in more insect and disease outbreaks, which could reduce squirrel habitat if no other disturbance occurred.

Guideline VEG G5 says habitat for red squirrels should be provided in each LAU. Although guidelines are not mandatory, if

this requirement were added to existing plans, it should benefit squirrels.

MIS birds

Blue grouse, yellow warbler and *willow flycatcher* habitat is associated with riparian areas and willows. Grazing Standards GRAZ S1, GRAZ S2 and GRAZ S3 would retain willow, aspen and riparian habitat, providing additional protection for these birds.

Mountain bluebirds, hairy woodpeckers, downy woodpeckers, northern flickers, red-breasted nuthatches, ruby crowned kinglets, three-toed woodpeckers and *yellow-bellied sapsuckers* all feed on the insects and nest in the cavities found in dead and dying trees. Standard VEG S3 could result in retaining habitat beneficial to these species. Standard VEG S4 in Alternatives B and C, and Guideline VEG G7 in Alternatives D and E, would add management direction to retain small patches of dead and down trees.

The *pileated woodpecker* is another species that may benefit from this direction. Pileated woodpeckers also use older forests. Standard VEG S4 or Guideline VEG G7 could result in a reduction of older forests if increased mortality from insects and disease occurred, but it's unlikely there would be large losses because the direction applies only to patches of dead trees smaller than five acres.

MIS fish & macro invertebrates

Fifteen MIS fish species occur in the amendment area; one NF has identified macro invertebrates as an MIS group. The effects for MIS fish and macro invertebrates are the same as those described for TEP and sensitive fish.

Cumulative effects

Alternative A

Management direction incorporated through the INFISH and PACFISH amendments, the OHV amendment, the Healthy Forest Rangeland Initiative and the Roadless Policy provides improved habitat conditions for wildlife and fish by providing secure areas and protecting special habitats, even without the added protections that would be afforded by the lynx amendment.

Cumulatively, the past, present and reasonably foreseeable actions described in Appendix L, would generally improve habitat conditions.

Alternatives B, D, D & E

The action alternatives would incorporate management direction to improve habitat conditions for most species by maintaining riparian habitat, reducing the disturbance associated with minerals and human uses, reducing habitat fragmentation and providing for animal movement.

Cumulatively, the past, present and reasonably foreseeable actions described in Appendix L, in addition to the lynx amendment, would improve habitat conditions.

Fire

Affected environment

Natural disturbances such as fire, wind, and insects and diseases, help shape forests. In the northern Rockies, periodic fire is the dominant disturbance process that changes forests.

While fire is widespread, it's seldom uniform. Every forest has its own characteristic pattern of fire intensity, frequency and size. *Fire regime* and *condition class* are used to characterize fire.

Fire regime

The fire regime describes the historic pattern of fire: how often (frequency); how hot (intensity); and how big (scale). Ecologists often describe three fire regimes for Western forests – *understory, mixed severity* and *stand replacing* (Agee 1993; Arno 2002; Brown & Smith 2000; Fischer & Bradley 1987; Hessburg & Agee in press; Jones & Barrett in press; Keane et al. 2002; Smith & Fisher 1997).

- *Understory* – Understory fires burn frequently, from once a year, to about once every 35 years, as *low-intensity* surface fires that consume forest litter and kill small trees in small patches. Understory fires generally do not kill large, fire-resistant trees or substantially change the structure of *the forest.*
- *Mixed severity* – Mixed-severity fires burn about every 35 to 100 years, as a *mixture* of *understory* and *stand-replacing* fires, or as *intermediate-intensity* fires that kill fire-susceptible trees while the fire-tolerant trees survive. Mixed-severity fires produce a diverse forest in terms of both structure and species composition. The fires are medium sized.
- *Stand replacing* – Stand-replacing fires are infrequent, burning about every 100 to 200 years. Stand-replacing fires are large and *high-intensity,* killing most trees. They make way for a new forest.

Historically, fires at lower elevations tended to be understory and fires at higher elevations stand-replacing, although substantial variability has always existed.

Condition class

Condition class describes the departure from historic conditions based on the number of missed fire cycles and the amount of change in forest structure and species composition (Schmidt et al. 2002).

- *Condition Class 1* – Fires have burned as often as they did historically; the risk of losing key ecosystem components is low. Vegetation composition and structure is intact and functioning.
- *Condition Class 2* – Fires have not burned as often as they did historically, missing one or more cycles. The risk of losing ecosystem

components is moderate, with moderate changes in fire size, intensity, landscape patterns or vegetation.

- *Condition Class 3* – Fires have significantly departed from their historic frequency by missing multiple cycles. The risk of losing ecosystem components is high, with dramatic changes to fire size, intensity, landscape patterns or vegetation.

Lynx habitat occurs in three kinds of forests in the amendment area:

- *Mixed conifer*, which includes Douglas fir, western larch, grand fir and western red cedar
- *Spruce/fir*, which includes Engelmann spruce, subalpine fir, alpine larch, hemlock and whitebark pine
- *Lodgepole pine*

Table 3-24 describes the fire regimes and condition classes of the three kinds of forests that constitute lynx habitat in Montana.

In mid-elevation *mixed conifer forests*, fires range from understory to stand replacing.

Fire suppression has limited how often fires burn. Some places have missed one or more fire cycles and fall into Condition Classes 2 or 3. Others are closer to historic conditions, in Condition Class 1.

Today, mixed conifer forests are generally denser and contain fewer fire tolerant species like western larch and ponderosa pine than when low- to intermediate-intensity fires kept parts of the forest thinned out (Quigley et al. 1996). Forest conditions today contribute to greater numbers of large high intensity fires.

In high-elevation *spruce/fir* and *lodgepole pine forests*, infrequent, severe fires are the norm. Because fires burn only about every 100 to 200 years in these cold, moist, high-elevation forests, fire suppression has had less of an effect than in other fire regimes. These naturally dense forests are close to historic conditions, generally in Condition Class I.

Excluding fire has also reduced the role played by low- and intermediate-intensity fires. At higher elevations, such fires kill competing fir and spruce trees so whitebark pine can grow and some lodgepole pine can develop old growth characteristics.

Fire suppression has changed the natural age distribution of forests at the landscape level. Stand-replacing fires used to create a mosaic of even-aged forests across the landscape. Today there are

Table 3-24. Lynx habitat by forest type, fire regime & condition class in Montana

Forest type	Fire regime	Condition class	Estimated % lynx habitat
Mixed conifer	Mostly mixed severity	1, 2 or 3	26%
Spruce/fir	Mostly stand replacing with some mixed severity	1	40%
Lodgepole pine	Mostly stand replacing with some mixed severity	1	34%

proportionately fewer young even-aged forests and more, older forests (Hessburg et al. 1999; Hillis et al. 2003; Losensky 2002). Excluding fire has resulted in a more homogenous landscape with an increased potential for larger stand-replacing fires.

In dry, warm low-elevation forests, frequent low-intensity fires are the norm, maintaining stands of large, widely spaced trees. Fire suppression has resulted in making many of these forests unnaturally dense, and the species composition has shifted away from ponderosa pine to Douglas fir.

These forests are where the greatest detrimental effects of excluding fire can be seen. These forests are in Condition Classes 2 and 3 (Arno 2002); these forests are not lynx habitat.

Policy

After 1910, when wildfires burned three million acres and killed 85 people in northern Idaho and western Montana, the Forest Service began to direct serious efforts toward suppressing wildfires. Severe fires occurred again in 1919, 1924, 1925 and 1934. In 1935, the agency adopted the "10 am policy," which said all fires were to be controlled by 10 am the day following their discovery. The policy was repealed in 1973 as the agency shifted from simply controlling fire to managing it and using it as a tool on federal lands.

Fire suppression for the last 80 years, along with grazing and logging, has changed the way fires burn and changed the age, species and structure of some forests (Quigley et al. 1996). Further, as people have built more homes in the woods, the ability to allow fire has decreased even as the fire risk has increased.

The results of excluding fire became increasingly apparent during the last decade of the 20th century. The federal government re-examined wildland fire policies. In 1995, the *Federal Wildland Fire Management Policy* was written to recognize the essential and inevitable role of fire, and the need to return, not eliminate, fire from forests.

Other recent documents set goals for wildland fire policy:

- *Managing the Impact of Wildfires on Communities & the Environment - the National Fire Plan* (USDA FS & USDI 2000)
- *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment – 10-Year Comprehensive Strategy* (USDA FS 2001)

They set goals to:

- Improve fire prevention and suppression
- Promote community assistance
- Restore fire-adapted ecosystems (rehabilitate the land after fire)
- Reduce hazardous fuels

This amendment addresses only the last goal – during scoping, wildland fire risk was identified as one of the primary issues.

Another recent document, *The Development of a Collaborative Fuel Treatment Program* (USDA FS et al. 2003), describes criteria for selecting fuel

treatment projects. The multi-party MOU (memorandum of understanding) defines high-priority areas as the WUI (wildland urban interface) and Condition Classes 2 and 3 outside the WUI.

Fuels program
Congress annually sets goals, program size and emphasis through its appropriations. Table 3-25 summarizes the annual FS fuels program projected for Montana based on these priorities. Almost half of the amendment area's lynx habitat is in Montana, providing a basis to characterize the fuels program for the amendment area.

In Montana, about 70 percent of the fuel treatments would occur inside the WUI (Lasko, pers. com.). Inside the WUI, fuel treatments most likely would be within a mile of structures and designed to reduce the intensity and spread of fire to communities. Many treatments would occur in the dry, low- to mid-elevation forests that have missed one or more fire cycles and are in Condition Classes 2 and 3.

At current funding levels, about 38,000 acres or one percent of the WUI would be treated annually.

The other 30 percent would occur outside the WUI.
Outside the WUI, fuel treatments most likely would be designed to restore or maintain a semblance of the forest structure historically produced by fire. Generally, restoration would occur on lands in Condition Classes 2 or 3, and maintenance in Condition Class 1 lands.

Annually about 16,000 acres would be restored or maintained by using prescribed fires and removing vegetation, generally in areas that have missed one or more fire cycles. Vegetation may be removed to reduce fire intensity before burning or as the sole method of treatment.

Each year where wildland fire use is allowed, some acres would be restored or maintained by lightning fires. In Montana, wildland fire use is allowed on about three million acres, which includes most wilderness areas and some non-wilderness land.

At current funding levels, less than one percent of the area outside the WUI could be treated annually.

Conditions in Montana

FIA data for Montana was used to find how often fuel treatments might take place inside winter snowshoe hare habitat where amendment restrictions may apply. Three key assumptions were used in this analysis:

- Fuel treatments would occur evenly across the landscape, regardless of condition class
- The WUI was defined as the zone

Table 3-25. Projected *annual* fuels program in Montana

	Inside WUI	Outside WUI	Total acres
Fuels program	38,000 acres	16,000 acres	54,000 acres
Forested, not wilderness	3,578,000 acres	8,335,000 acres	11,913,000 acres

Table 3-26. Lynx habitat in Montana

	Lynx habitat	High-density	Low-density	NF lands
Inside WUI	1,685,000 acres	382,000 acres	307,000 acres	3,578,000 acres
Outside WUI	5,519,000 acres	1,460,000 acres	1,065,000 acres	8,335,000 acres
Wilderness	1,856,000 acres	511,000 acres	395,000 acres	2,653,000 acres
Non-forested	0	0	0	2,888,000 acres
Total	9,060,000 acres	2,353,000 acres	1,767,000 acres	17,454,000 acres

within a mile of where people live, liberally measured as just one structure per ten square miles, and

- Winter snowshoe hare habitat is composed of both high- and low-density forests – see the *Lynx* section.

Table 3-26 shows how much winter snowshoe hare habitat is estimated to be inside and outside the WUI.

Conditions in Montana can be summarized as follows:

1) About 52 percent[4] of the NF acres in Montana are lynx habitat
2) About 47 percent[5] of the WUI is lynx habitat
3) About 11 percent[6] of the WUI is high-density forests
4) About nine percent[7] of the WUI is low-density forests
5) About 1.7 million acres, or about ten percent[8] of the NF acres in Montana, are lynx habitat inside the WUI

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[4] 9,060,000 / 17,454,000 = 52%

[5] 1,685,000 / 3,578,000 = 47%

[6] 382,000 / 3,578,000 = 11%

[7] 307,000 / 3,578,000 = 9%

[8] 1,685,000 / 17,454,000 = 10%

Effects

Three factors influence fire behavior – weather, topography and vegetation. Land managers can modify only vegetation.

The vegetation characteristics that influence fire behavior are the species composition, and the amount and arrangement of the vegetation.

Fuel treatments change fire behavior by changing the arrangement or reducing the amount of vegetation, which reduces how hot fires can burn. Fuel treatments are designed to reduce the spread and intensity of surface fire, and the initiation and spread of crown fire. Fuels can be reduced by burning or by physically removing vegetation.

Many fuel treatments designed to reduce the fire risk to communities occur within a mile of structures. Others may take place several miles away, when topography, wind patterns and fuels combine to create the potential for fire to spread to a community.

For structures to be protected, landowners must clear the fuels 100 to 200 feet away from structures and build or change their structures to be fire-resistant (Cohen, 2000 a & b).

While fuel treatments don't prevent fires, they do increase the likelihood that structures will be left standing after fire. Even when the fuels have been treated, fires may still threaten communities and be outside the control of firefighters during extreme weather conditions.

Since fire is a natural and necessary forest disturbance process, the goal of some fuel treatments is to restore and maintain the presence of fire. The health of some forests is declining because fire has been excluded. Treatments are designed to resemble historic fire, or to reduce vegetation so when fire does occur, it will behave more like it does under historic conditions.

Restoration and maintenance are not directly associated with protecting homes in the WUI. However, depending on their location, such treatments may contribute to reducing the threat of crown fires to communities (Finney 2001).

Table 3-27. Projected fuels program in Montana after a decade

	Fuel treatment program	High-density lynx habitat	Low-density lynx habitat
Inside WUI	380,000 acres	38,000 acres	35,000 acres
Outside WUI	160,000 acres	27,000 acres	20,000 acres
Total	540,000 acres	65,000 acres	55,000 acres

The acres of fuel treatment projected inside the WUI may be high because WUI was so liberally defined for this analysis and because site-specific conditions may show some areas are not a treatment priority.

Alternative A, no action

Under the no-action alternative, agencies would implement the *National Fire Plan* and the *10-Year Comprehensive Strategy* within the direction set by existing plans and fire plans.

In Montana, about 540,000 acres of fuel treatment are projected for the next decade – see Table 3-27. About 380,000 acres are inside the WUI. Of these, 73,000 acres may be both inside the WUI and in high- or low-density forests. The no-action alternative would allow fuel treatments inside lynx habitat.

Alternatives B, C & D

Under the action alternatives, agencies would add management direction that would apply to fuel treatments in lynx habitat. The management direction for these alternatives does not affect fire suppression – that's an emergency – or wildland fire use, which replicates the natural role of fire and typically occurs in wilderness areas. See Table 2-1 in Chapter 2.

Objectives VEG O1 & VEG O3

- Objective VEG O1 says to manage vegetation similar to historic patterns while maintaining the habitat components that help conserve lynx.
- Objective VEG O3 says to use fire to restore ecological processes and maintain or improve lynx habitat.

Both objectives are compatible with the *National Fire Plan* and the *10-Year Comprehensive Strategy*. The objectives support mechanically removing vegetation and using fire to maintain and restore wildlands consistent with historic disturbance patterns.

Standard VEG S1

Standard VEG S1 says vegetation management projects may not result in more than 30 percent unsuitable habitat, unless a broad-scale assessment substantiates higher historic levels. Most fuel treatments could be designed to retain enough trees to meet the terms of Standard VEG S1.

Alternative B

Under Alternative B, Standard VEG S1 would apply the 30 percent limit to a single LAU.

In Region 1, less than 13 percent of the LAUs currently exceed 30 percent unsuitable, mostly due to large wildfires (Hillis et al. 2003). The impact of the 30 percent standard limiting fuel treatments would be small because most LAUs are well within the standard. LAUs that don't meet the standard are less likely to need treatment to reduce fuels.

Alternative C

Under Alternative C, Standard VEG S1 would apply the 30 percent limit to a single LAU or a fixed combination of adjacent LAUs, but would not limit prescribed fires. Outside winter snowshoe hare habitat, vegetation could be removed to treat fuels before burning was done.

Mechanical fuel treatments may be prohibited in a few areas where large fires have burned, such as the 1988 Yellowstone fires (Hillis et al. 2003). The effects would be less than those under Alternative B.

Alternative D
Under Alternative D, Standard VEG S1 would apply the 30 percent limit to a sub-basin or isolated mountain range.

Prescribed fires and mechanical fuel treatments would be prohibited only in a very few areas that have had large landscape fires (Hillis et al. 2003). The effects would be less than those under Alternative C.

Alternative E
Under Alternative E, Standard VEG S1 would not apply to fuel treatments developed through a collaborative process; therefore, it would not constrain them.

Standard VEG S2
Standard VEG S2 says timber projects may not result in more than 15 percent unsuitable habitat in an LAU in a ten-year period.

Most fuel treatments could be designed to retain enough trees to meet the terms of Standard VEG S2, but sometimes they might remove more vegetation and create unsuitable habitat.

Currently about 13 percent of the LAUs in Region 1 have more than 15 percent unsuitable habitat, very few due to timber harvest (Hillis et al. 2003), so the impact of the 15 percent limit would be small.

Alternative B
Under Alternative B, the 15 percent limit applies only to commercial timber sales. It does not limit prescribed fires or mechanical treatments like piling and brushing that do not produce commercial wood products.

Timber sale proceeds would not be available to offset project costs. The number of fuel treatments, including stewardship projects, could be reduced.

Alternative C
Under Alternative C, the mandatory standard becomes a less restrictive guideline, Guideline VEG G6. The need to treat fuels could be cited as a rationale to deviate from the guideline. Therefore, this alternative would have a limited effect on fuel treatments.

Alternatives D & E
Under Alternatives D and E, the direction is dropped altogether, so there is no effect.

Standard VEG S3
Standard VEG S3 would require maintaining ten percent denning habitat in an LAU. Denning habitat is most common in stands with plenty of coarse woody debris, which can provide fuel for fires.

Denning habitat is likely not limiting in most of the amendment area (Hickenbottom et al. 1999, p. 69) because most existing plans have direction to retain old growth or down woody debris. When an LAU doesn't have enough denning habitat, all existing denning habitat plus areas with the potential to develop into denning habitat would have to be identified and maintained.

Alternatives B & C
Under Alternatives B and C, Standard VEG S3 would not allow fuel treatments in denning habitat or in areas with the most potential to develop into denning habitat, when less than ten percent exists in an LAU.

At most, this standard would affect fuel treatments in ten percent of an LAU. Since it does not affect the remaining 90 percent, there's likely to be little effect.

Alternative D
Alternative D would modify Standard VEG S3 by allowing the effects of fuel treatments to be mitigated. Treatments would need to leave enough overstory trees and coarse woody debris to provide den sites.

Generally, fuel treatments could be designed to meet the standard, so it would have very limited or no effect.

Alternative E
Under Alternative E, Standard VEG S3 would not apply to fuel treatments developed through a collaborative process; therefore, it would not constrain them.

Standard VEG S4
Alternatives B & C
Under Alternatives B and C, Standard VEG S4 would in most cases prohibit salvage harvest in disturbed areas smaller than five acres. The limit does not apply to disturbed areas larger than five acres, prescribed fires or to mechanical treatments like brushing and piling that don't produce commercial wood products.

While most fuel treatments could be designed to meet the objectives of Standard VEG S4, timber sale proceeds would not be available to offset project costs. The number of fuel treatments, including stewardship projects, could be reduced. Otherwise, the standard would have no effect or a very limited effect.

Alternatives D & E
Under Alternatives D and E, the mandatory standard is changed to a less restrictive guideline, Guideline VEG G7. Retaining small patches of dead trees would have to be considered, but salvage harvest could take place when there were reasons to deviate from the guideline.

Under Alternatives D and E, projects could be designed to meet Guideline VEG G7, so the guideline would have very limited or no effect.

Standards VEG S5 and VEG S6
Standard VEG S5 limits vegetation management projects that reduce winter snowshoe hare habitat in young regenerating forests; Standard VEG S6 imposes limits in multistoried forests.

Generally, young regenerating forests are not a high priority for fuel treatment. Young forests are less capable of supporting high intensity fire in stand replacing fire regimes. As these forests grow up, fuels accumulate and they become more susceptible to fires of greater intensity and magnitude and may become a priority for treatment.

Multistoried forests are more likely to be a priority for fuel treatment.

Alternative B
Under Alternative B, Standards VEG S5 and VEG S6 would allow precommercial thinning – thinning the understory trees that lack commercial value – only within 200 feet of structures. Prescribed burning or commercial timber sales could be used to treat fuels.

About 120,000 acres of NF lands could be treated for fuels in Montana winter snowshoe hare habitat during the next decade. Under Alternative B, about 60,000 acres – 36,000 acres in the WUI – could be relocated to avoid thinning in winter snowshoe hare habitat – see Table 3-28. However, since other treatment methods are available, the effect is likely limited.

Alternative C
Under Alternative C, Standards VEG S5 and VEG S6 would allow vegetation management projects only for research and within 200 feet of structures.

About 120,000 acres of NF lands could be treated for fuels in Montana winter snowshoe hare habitat during the next decade. Under Alternative C, all those treatments could be relocated to avoid reducing winter snowshoe hare habitat.

Where Standards VEG S5 and VEG S6 preclude fuel treatment, the ability to reduce fuels and fire risk could decrease. It's unknown if the standards would restrict the ability to treat fuels in critical places – each situation would have to be evaluated at the project level. It's possible effective treatment could be done instead in places that aren't hare habitat.

Alternative D
Under Alternative D, Standards VEG S5 and VEG S6 would allow precommercial thinning and other vegetation management projects either to restore tree species in decline or where the amount of winter snowshoe hare habitat is greater than the historic range – see the *Forests* section later in Chapter 3.

Fuel treatments that create openings would sometimes be allowed and may reduce fire spread and intensity. It's likely fewer treatments would have to be relocated to avoid winter snowshoe hare habitat under Alternative D but how many is unknown.

Alternative E
Under Alternative E, Standard VEG S5 would not apply to fuel treatments and Standard VEG S6 is changed to a less restrictive guideline, Guideline VEG S8. The need to treat fuels could be cited as a rationale to deviate from the guideline. Therefore, Standard VEG S5 and

Table 3-28. Fuel treatments in Montana possibly moved to avoid hare habitat in a decade

	Alt A	Alt B	Alt C	Alt D	Alt E
Inside WUI (380,000 acres fuel treatment projected)					
High density forests	0 acres	19,000 acres	38,000 acres	38,000 acres	0 acres
Low density forests	*0 acres*	*17,000 acres*	*34,000 acres*	*34,000 acres*	*0 acres*
Outside WUI (160,000 acres fuel treatment projected)					
High density forests	0 acres	13,000 acres	27,000 acres	27,000 acres	0 acres
Low density forests	*0 acres*	*11,000 acres*	*21,000 acres*	*21,000 acres*	*0 acres*
Total (540,000 acres)					
Total	0 acres	60,000 acres	120,000 acres	120,000 acres	0 acres

It's possible some fuel treatments in low density forests would not need to be relocated because they may lack the horizontal cover needed to provide winter snowshoe hare habitat – see *Lynx* section.

Guideline VEG G8 would have little to no effect on fuel treatments.

Effects summary

Alternative B

Alternative B would affect the ability to conduct some fuel treatments. In most cases, fuel treatments either would meet the terms of the standards or could be designed to avoid lynx habitat components.

Alternative B could limit the ability to reduce fire risk to communities in the one percent[9] of the WUI that may be winter snowshoe hare habitat.

Alternative B also limits the ability to reduce fire risk to communities in less than one percent[10] of the area *outside* the WUI and wilderness.

Alternative C

Alternative C would affect the ability to conduct some fuel treatments. In many cases, fuel treatments either would meet the terms of the standards or could be designed to avoid lynx habitat components.

Alternative C could limit the ability to reduce fire risk to communities in the two percent[11] of the WUI that's winter snowshoe hare habitat.

Alternative C also limits the ability to reduce fire risk to communities in less than one percent[12] of the area *outside* the WUI and wilderness. However, since 75 percent of winter snowshoe hare habitat falls in Condition Class 1, it's not likely to be a priority for treatment, so the effect would be limited.

Alternative D

Alternative D also would affect the ability to conduct fuel treatment, but to a lesser degree than Alternative C. Some standards become guidelines and more activities are allowed. It provides more options for designing fuel treatments.

Alternative E

Alternative E would allow all fuel treatments to occur.

Air quality

The proposed action and other action alternatives would not add management direction that would change the effects on air quality compared to existing plans.

Although the amendment would add objectives that encourage using fire, it would occur as described under existing plans. Future treatments would analyze the effects on air quality based on current laws and regulations.

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[9] See Tables 3-26 and 3-28
36,000 acres/3,578,000 acres = 1%

[10] 24,000 acres/8,335,000 acres = 3/10%

[11] 72,000 acres/3,578,000 acres = 2%

[12] 48,000 acres/8,335,000 acres = ½%

Cumulative effects

Fire suppression has reduced the amount fire in Rocky Mountain forests since the early 1930s. Because these forests evolved with fire, its absence has altered forest conditions and health. Changes include increases in forest cover and density, and decreases in trees that can't tolerate shade like pines and western larch. Fuel loads are unnaturally high.

As a result, the health of some forest ecosystems is in decline, especially in the warm, dry, low-elevation forests where fire used to occur frequently. Lynx habitat does not occur in such forests.

Under the *National Fire Plan* and the *10-Year Comprehensive Strategy*, fire suppression would continue, but the Forest Service and BLM would implement fuel treatments targeting the highest risk communities and forest ecosystems. This amounts to areas close to where people live with an understory or mixed-severity fire regime.

Fuel treatments would be less likely in lynx habitat, which predominately occurs in the high elevation spruce-fir and lodgepole forests with stand-replacing fire regimes and which are closer to the historic condition.

While fire exclusion has not yet significantly altered forests that evolved with infrequent fires, landscape changes are noticeable (Keane et al. 2002). Forests with young age class trees are often missing. Fuel treatments could benefit lynx by creating young stands that would develop into high-quality winter snowshoes hare habitat.

Alternatives A, B, C, D & E

Some fuel treatments could be necessary where lynx habitat is susceptible to fire and close to a community. Alternatives A and E would allow such treatments in winter snowshoe hare habitat. Alternative B would allow many treatments, and Alternatives C and D would preclude more.

Forests

This section describes the forested environment of the amendment area and the effects of the alternatives. The *Economics* section later in Chapter 3 provides more information about the economic effects, particularly about the proposed precommercial thinning restrictions. More information can be found in the Project Record.

Disturbance regimes

Wildfire

Wildfire plays a major role in determining forest structure, composition and landscape patterns in the northern Rocky Mountains. Fire history data from the Interior Columbia Basin region shows extensive fire activity at least every decade or two between the mid-1500s and the early 1900s (Barrett et al. 1997). An estimated 12 million acres burned in the northern Rockies between 1908 and 1947 (Lotan et al. 1985). The largest known fire years since 1900 each burned from two to three million acres in the Interior Columbia Basin region (Arno, records on file, Intermountain Fire Sciences Lab, Missoula, MT).

Wildfire plays a major disturbance role in the higher elevations (Reudiger et al. 2000). Although lynx habitat typically has mixed severity to stand-replacing fire regimes, some fires are low intensity, which allow some tree species to survive fire. See the discussion in the Chapter 3 *Fire* section.

Species such as western larch, lodgepole pine, ponderosa pine quaking aspen, western white pine and whitebark pine have adapted to fire as a major disturbance agent (Fischer & Bradley 1987; Smith & Fischer 1997). Due to fire suppression during the last 80 years, many of these species have declined (Quigley et al. 1996).

Logging

Logging has changed the landscape in some places. Extensive salvage logging took place after mountain pine beetles killed many trees during the 1960s through the 1980s in large areas in the southern and eastern parts of the northern Rocky Mountains.

The cedar-hemlock zone in north Idaho and the larch-lodgepole forests of western Montana, also have a history of logging on the more accessible terrain.

Timber harvest in these areas has contributed to the quantity of young regenerating forests, although fire has had a much greater impact.

Stand initiation stage

A forest's *structure* consists of its appearance, species composition, growth, resistance to disturbance, etc. The structure is largely set by the spatial arrangement and heights of the trees by the time they reach the stem exclusion stage – see Figure 3-2 in the *Lynx* section. Precommercial thinning generally takes place in the stand initiation stage, before stem exclusion has occurred, and sets the stage for the future.

In mixed-species forests, dominant trees in the understory often grow rapidly after thinning releases them from competition. Species that need full sun die if they become much suppressed; they must be thinned when the trees still have large enough crowns to respond (Oliver & Larson 1996). Severely suppressed trees may never respond.

Most precommercial thinning occurs on lands in the suitable timber base. Historically, trees were thinned to a uniform spacing to improve growth and yield of future wood products.

The management objectives for the suitable time base have been broadened to include ecosystem and restoration purposes (USDA FS 1997b). Today, precommercial thinning using variable spacing is commonly used to promote structural and compositional diversity and to promote the historic representation of forest cover types.

Daylight thinning

Daylight thinning is a modified version of precommercial thinning that could preserve most of the forage and still provide relief from crowding for trees that need full sun. *Daylight thinning* would remove no more than 20 percent of the small trees and shrubs that provide winter snowshoe hare habitat. An area from eight to 20 feet in diameter would be cleared around the best performing trees; no trees or shrubs would be removed outside the cleared area.

- If eight-foot-diameter clearings were used, about 150 trees per acre could be released
- If 20-foot-diameter clearings were used, less than 30 trees per acre would be released

Western white pine

Western white pine *(Pinus monticola)* grows in the moist forests in northern Idaho and western Montana. This tree has been in major decline over the past 60 years.

The proportion of western white pine declined from 44 percent in 1941 to five percent in 1979 (Graham 1990). Since the 1930s, more than 95 percent of western white pine cover types have converted to grand fir, Douglas fir or western red cedar/western hemlock (USDA FS 1998). Only about 90,000 acres in north Idaho and western Montana still exist in the western white pine cover type, according to FIA data.

Western white pine blister rust (*Cronartium ribicola*) spread to the Pacific Northwest from Europe by the 1920s (Graham et al. 1993) and killed many trees

in northern Idaho. Naturally occurring rust-resistant wild trees were discovered in the 1940s; genetic resistance is carried in a low percentage of the population. It's the basis of selection to increase the frequency of resistant genes in western white pine planting stock (Byler et al. 1993). As such, rust-resistant trees are an important part of the genetic resource program.

Fire suppression and logging changed the distribution of western white pine. In pre-settlement times, low- and intermediate-intensity burns produced an irregular, patchy mosaic of vegetation. Fires frequently shortened how long the dense stem-exclusion stages lasted by thinning them and breaking holes in uniform canopies (Zack & Morgan 1994).

Western white pine is well adapted to mixed-severity fire regimes. In fact, it depends on the disturbance fire or timber harvest provides to remove competing conifers and allow it to become established (Graham 1990). Its relatively thin bark and moderately flammable foliage make it intermediate in fire resistance (Graham 1990). In the past, fire removed the competing conifers (Graham 1990).

Restoring western white pine
Restoring western white pine involves planting trees that can resist blister rust and thinning them (USDA FS 1998). About 96,000 acres were planted in FS Region 1 to rust-resistant western white pine between 1973 and 2001.

Neither natural forests nor plantations of western white pine respond well to thinning after they are 30 years old (Graham et al. 1993). Precommercial thinning reduces the probability of insect and disease attacks and stand-replacing fires by removing shade-tolerant trees.

About 70,700 acres of western white pine are scheduled for precommercial thinning during the next decade; 51,090 acres are in lynx habitat. See Table 3-29.

The thinning would help the planted trees survive and give them a competitive advantage over competing trees, without relying on other disturbances. The seed source these rust-resistant trees represent is vital to the future of western white pine forests on the landscape.

Alternative A, no action
Precommercial thinning would continue, allowing planted rust-resistant western white pine to successfully compete with shade-tolerant trees. About 70,700 acres could be precommercially thinned – this amounts to almost 75 percent of the western white pine planted during the last 20 years. The no-action alternative would contribute to restoring this species.

Even if full funding is not received, these acres are the number one priority for thinning in FS Region 1; therefore, it's likely all 70,700 acres of thinning scheduled in planted western white pine would occur.

Table 3-29. Planted western white pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Western white pine	51,090 acres	19,610 acres	70,700 acres

Alternatives B, C & E
Alternatives B, C and E would defer precommercial thinning on 51,090 acres inside lynx habitat. It's likely the white pine seedlings planted would not reach maturity unless something disturbs the plantations, because the species can't compete without disturbance.

White pine does not respond to delayed thinning, after the forest no longer provides winter snowshoe hare habitat and the trees are 45 years old.

The likely result of Alternatives B, C and E would be the loss of white pine on more than 70 percent of these planted acres, the species' continued decline and the loss of most of the investment in these plantations.

Alternative D
Under Alternative D, daylight thinning could be used to restore planted western white pine while retaining winter snowshoe hare habitat. The investments in rust-resistant trees could be protected on the 51,090 acres in lynx habitat.

Generally, trees were planted at a density of 300 per acre. Using daylight thinning, depending on the spacing, from about 150 to less than 30 trees per acre would be protected.

This restricted approach to thinning would not release all the planted trees from competition and may not be the ideal approach to restore this species, but some would survive into maturity and produce rust-resistant seed, resulting in future generations of rust-resistant trees. Alternative D is likely to maintain and restore this species.

Whitebark pine
Whitebark pine (*Pinus albicaulis*) is a hardy subalpine conifer that tolerates poor soils, steep slopes and windy exposures. It grows at higher elevations across much of the northern Rockies.

Currently, whitebark pine is found mainly at the timberline. It's a component of many habitat types and is distributed across a variety of site conditions in the amendment area.

In lynx habitat, whitebark pine is found in productive places where it grows densely with western white pine, spruce and fir. It also grows in sparse clusters on harsh, rocky places in the upper sub-alpine zone. Harsh whitebark pine sites do not support the stem densities capable of supporting hare populations and are not considered lynx habitat.

Whitebark pine is hardier than other conifers and can become established on dry, cold subalpine sites. It's a relatively slow growing tree and can be out-competed for growing space by conifers that are more shade tolerant. Where it competes with other species that need full sun, whitebark pine is often able to maintain its presence (Tomback et al. 2001).

Historically, whitebark pine accounted for ten to 15 percent of the forest cover in the northern Rocky Mountains (Arno & Weaver 1990); now it amounts to only about five percent. In the amendment area, about 1.5 million acres are in the whitebark pine cover type. Blister rust and fire suppression have substantially reduced its presence. Epidemics of

mountain pine beetles have further reduced isolated populations.

Historically, mixed severity fires maintained whitebark pine at high elevations by removing competing species. Without fire, whitebark pine is eventually replaced by subalpine fir and spruce. The long-term consequence of keeping fire out is changing the fire regime from mixed severity to stand – replacing (Arno & Hoff 1990; Keanne et al. 2002).

Restoring whitebark pine

Restoring historic fire regimes at the landscape level would be the most successful restoration technique for whitebark pine (Tomback et al. 2001; Keane et al. 2000; Arno pers. com.). Indeed, the viability of the species may depend on broad-scale landscape solutions (Keane et al. 2000). In national parks and wilderness areas where larger landscape fires may be allowed to burn, both prescribed fire and silviculture practices can be used (Tomback et al. 2001). Prescribed fire has been used experimentally to restore whitebark pine on a small scale.

In a practical sense, restoring a historic fire regime throughout the range of whitebark pine would be difficult. Silvicultural treatments that imitate the effects of a mixed fire regime – primarily thinning and precommercial thinning in subalpine fir habitat types – are recommended (Tomback et al. 2001; Arno pers. com.). Thinning out understory shade-tolerant trees is one alternative to fire that can create openings in the forest canopy and imitate the results of the low- and mid-intensity fires. Precommercial thinning combined with fire, followed by planting blister-rust resistant seedlings, may be the best way to restore these communities (Tomback et al 2001).

When a new whitebark pine stand grows up after fire, it may be overly dense and need thinning. Thinning whitebark pine is not recommended in places that are at high risk for blister rust because the disease may attack and kill nonresistant trees (Tomback et al 2001). It's also possible that thinning the competing conifers and shrubs could create habitat for the alternate host of blister rust, although forest openings that receive less than 80 to 90 percent full sunlight will generally not support the alternate host (Tomback et al. 2001).

About 9,110 of the 9,360 acres of the precommercial thinning in whitebark pine scheduled for the next decade are in lynx habitat – see Table 3-30. Another 51,000 acres in lynx habitat are planned for prescribed fire without thinning. Some of these acres are likely winter snowshoe hare habitat.

Alternative A, no action

Precommercial thinning that favors whitebark pine may take place during the

Table 3-30. Whitebark pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Whitebark pine	9,110 acres	250 acres	9,360 acres

next decade on 9,360 acres under the no-action alternative if fully funded. Most of this thinning is in lynx habitat. The no-action alternative would allow precommercial thinning and other restoration activities like prescribed fire to help maintain and restore whitebark pine.

Alternatives B & C
Alternatives B and C would defer precommercial thinning in lynx habitat until the forests self-pruned above the reach of snowshoe hares. These alternatives would result in the continued decline of whitebark pine on 9,110 acres in lynx habitat. Some decline would likely continue anyway unless full funding was received, and there is no guarantee of that.

Under Alternative B, other restoration activities such as prescribed fire could still take place to help whitebark pine.

Under Alternative C, Standards VEG S5 and VEG S6 would preclude using prescribed fire in winter snowshoe hare habitat, leaving no tools except wildfire to restore whitebark pine, and resulting in an even greater decline.

Alternatives D & E
Alternative D would allow using whatever methods are needed to restore and maintain whitebark pine. Alternative E would allow projects that restore fire-adapted ecosystems to restore whitebark pine.

Restoring whitebark pine forests could involve removing competing vegetation and returning fire to the landscape. Removing competing vegetation would improve the vigor and growth of individual trees, improving its ability to survive future fires and produce seed to regenerate naturally.

Assuming full funding, about 9,110 acres of whitebark forests in lynx habitat could be precommercially thinned in the next decade.

Quaking aspen
Quaking aspen *(Populus tremuloides)* is a species that needs full sun that commonly grows in even-aged forests. Aspen is distributed throughout the northern Rockies in small, isolated areas, and is more extensive east of the Continental Divide in Montana and in the southern half of the amendment area in Wyoming and Utah (Mueggler 1985). About 500,000 acres of aspen grow in the amendment area, according to FIA data.

Some single-storied aspen forests have two distinct generations, consisting of a more or less substantial scattering of old veterans that stand among younger, more slender trees. The older trees usually are survivors of fire a decade or more earlier that killed many of them and gave rise to the younger trees. Many of the younger trees grow as tall as the older ones, and with them, form a closed canopy (Jones & DeByle 1985).

Conifers growing beneath aspen are generally younger than the aspen because aspen regenerates so quickly from existing roots (Sheppard & Jones 1985).

Fire has been the most important disturbance factor in aspen, changing structural stages and composition and minimizing competition by conifers. If fire takes place infrequently (every 50 years or so) and is intense enough to kill

most or all of the aspen trees and the competing conifers, aspen is retained (Jones & DeByle 1985).

Mixed-severity fires where aspen grow at mid- and high elevations historically regenerated to this species and maintained these stages in balance. Severe or repeated burns may reduce site quality, resulting in reduced growth rates.

From 50 to 70 percent of the quaking aspen in FS Region 1 has been lost because of fire suppression and grazing (USDA FS 1998). Grass, forbs, shrubs or conifers may replace aspen in the absence of fire (Jones & DeByle 1985). Many aspen forests are threatened with invasion by shade-tolerant conifers.

Restoring quaking aspen
Silvicultural treatments at the stand scale have been too small to effectively maintain quaking aspen at the landscape scale (USDA FS 1998). Without fire, human intervention appears to be necessary for the continued well-being of aspen (Jones and DeByle 1985).

Precommercial thinning to restore aspen is scheduled in 6,120 acres of young forests during the next decade; 3,050 acres are in lynx habitat. See Table 3-31.

Alternative A, no action
When conifers compete with aspen, precommercial thinning can lengthen the time aspen has a competitive advantage. If fully funded, precommercial thinning may take place on 3,050 acres in lynx habitat, so aspen could be retained.

Alternatives B, C & E
Alternatives B, C and E would not allow precommercial thinning in lynx habitat until forests have self-pruned above the reach of snowshoe hares. Precommercial thinning would be deferred on about 3,050 acres in lynx habitat. Some precommercial thinning may be allowed under Alternative E if the purpose is to restore fire-adapted ecosystems.

Conifer encroachment would result in reducing aspen dominance, reducing the likelihood aspen would be able to regenerate from root suckering and dominate future generations by overwhelming a site with suckers.

Although the alternatives do not affect many acres, without the compensating results of returning fire to the landscape, aspen would likely continue its decline and become an even smaller part of the ecosystem.

Alternative D
Alternative D would allow precommercial thinning to restore aspen. Conifers would be removed, so aspen can establish a healthy root system capable of suckering or sprouting when the stand is next disturbed by fire or harvest. Thinning would give it a competitive advantage and encourage it as hare forage.

Table 3-31. Quaking aspen precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Quaking aspen	3,050 acres	3,070 acres	6,120 acres

Aspen forests may be maintained and restored on up to 3,050 acres in lynx habitat if fully funded.

Western larch

Western larch *(Larix occidentalis)* is found in northern Idaho and western Montana. Larch grows in diverse habitats, ranging from moist Douglas fir and grand fir, western red cedar and western hemlock, to cooler sub-alpine fir sites.

Larch is the conifer species that most needs full sun in the northern Rockies. It regenerates in full sunlight and large openings after major disturbance. To survive, larch must maintain a dominant position in the stand. If overtopped by other trees, larch growth will slow and the trees usually die (Fielder & Lloyd 1995).

Larch is extremely well adapted to fire. Mature larch have bark that's often more than six inches thick, containing little resin, with branches far above the ground and foliage of low flammability.

Larch is able to tolerate crown scorch and defoliation, producing new foliage and re-branching on the trunk. At least some of the old larch usually survives even intense fires, at least long enough to produce a seed crop to regenerate receptive seedbeds (Schmidt & Shearer 1995).

Even young larch wounded at the base of the stem in a surface fire, heal and continue to grow for centuries. On burned seedbeds, larch seedlings generally outgrow their competitors (Arno & Fischer 1995).

Historically, fire maintained larch (Schmidt & Shearer 1995). Stand-replacing fires burned moist larch sites at mean intervals of from 120 to 350 years. Low- to intermediate-intensity fires favored larch by thinning out much of the competition (Arno & Fischer 1995; Carlson et al. 1995).

After fire, a residual cover of 20 percent or fewer large trees was common historically (Quigley et al. 1996). This structure of large residual trees, occurring singly or in small groups, has declined in many areas. The big larch has been logged out in many places.

In moist places lacking fire or thinning, trees that are more shade-tolerant can replace larch in 90 to 140 years. With fire or thinning, larch can maintain dominance for 200 years or more.

Western larch has declined in the northern Rockies because of fire suppression and logging (USDA FS 1998). Tree species composition has shifted to shade-tolerant Douglas fir, grand fir and lodgepole pine. Because of the shift, current fire-return intervals are longer than 100 years and fire behavior is more extreme, rather than the combination of fires that favored larch (USDA FS 1998).

Table 3-32. Western larch precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Western larch	123,160 acres	45,280 acres	168,440 acres

Restoring western larch
Much of the remaining young larch is too dense to survive to maturity (USDA FS 1998). Restoring western larch includes precommercial thinning to maintain its competitive advantage and insure progress into mature trees that can help areas naturally regenerate after fire.

Precommercial thinning is an important approach to help restore western larch and is scheduled on 168,440 acres of young forests during the next decade; 123,160 acres are in lynx habitat – see Table 3-32.

Alternative A, no action
The no-action alternative would continue the current precommercial thinning program, increasing the probability of developing a structural component of old-growth larch that can survive fire to regenerate future forests. If fully funded, precommercial thinning may take place on up to 123,160 acres in lynx habitat.

Many larch plantations lack an overstory – without thinning, they may never develop into mature trees that can survive fire. The no-action alternative would maintain larch on the landscape by imitating natural disturbance processes.

Alternatives B, C & E
These alternatives would restrict precommercial thinning in lynx habitat until the forests no longer provide winter snowshoe hare forage, and larch likely would continue to decline there.

Many of these forests lack the mature, fire-resistant trees capable of reseeding burned landscapes consistent with historic patterns. Since large trees are missing, without extensive fire and expensive artificial regeneration, larch likely would continue to decline on about 123,160 acres in lynx habitat.

Some thinning may be allowed under Alternative E if the purpose is to restore fire to the ecosystem.

Alternative D
Alternative D would permit daylight thinning, retaining up to 80 percent of the winter snowshoe hare habitat. Thinning would release young larch from suppression, so large trees could develop, survive fire and re-seed future forests.

Trees would be selected randomly, depending on where the healthiest larch stems were found. To retain 80 percent of the cover, about 20 trees per acre could be daylight thinned to a radius of 12 feet. This restricted approach to thinning would help return the competitive advantage to this fire-resistant species that needs full sun. Daylight thinning would not protect all the trees and may not the be the ideal approach to restore this species, but some would survive into maturity and produce seed, resulting in future generations and resulting in long-lived snags. Alternative D would help maintain this species on the landscape.

Daylight thinning in lynx habitat would provide enough trees to perpetuate the species through natural regeneration after stand-replacing fire. If fully funded, about 123,160 acres of larch could be thinned in lynx habitat.

Ponderosa pine

Ponderosa pine *(Pinus ponderosa)* is not significantly represented in lynx habitat in the northern Rockies. Generally, it grows in places too dry to support snowshoe hare and lynx; however, it is represented in lynx habitat in the warm, moist cedar forests of northern Idaho and western Montana.

Fire has played a major role in cedar forests with ponderosa pine. The diverse species and structures indicate pre-settlement fire patterns were highly variable. Shorter fire-return intervals likely favored ponderosa pine. Most cedar forests experienced mixed-severity fire. The ponderosa pines were able to survive some stand-replacing fires (Smith & Fischer 1997).

In most of lynx habitat, shade-tolerant trees out-compete ponderosa pine without some disturbance that reduces stem densities. Even if fire were returned to these ecosystems, the younger ponderosa pine would need to be thinned out for them to grow large enough to be able to endure fire. In many places, timber harvest has removed the large pines. In other places, the big trees are so stressed from high understory stem densities that needle diseases and bark beetles are killing them at high rates.

Historically, ponderosa pine forests developed because frequent low-intensity surface fires killed the competing conifers and prepared a seedbed for the pine (Steele 1987). Low-intensity fires helped maintain them because sapling and larger ponderosa pine are more fire resistant than most other species (Oliver & Ryker 1990; Saveland & Bunting 1987).

Restoring ponderosa pine

The small, low-intensity fires are no longer occurring. Instead, even-aged harvest and the changes in wildfire during the last 80 years, mean that more disturbances will be needed to maintain ponderosa pine as a major component.

With full funding, 11,660 acres of ponderosa pine could be precommercially thinning during the next decade in lynx habitat – see Table 3-33.

Alternative A, no action

The no-action alternative would help maintain ponderosa pine forests in lynx habitat, resulting in more-resilient ecosystems because they would contain fire-adapted species. About 11,660 acres of ponderosa pine in lynx habitat would be precommercially thinned under the no-action alternative if fully funded.

Alternatives B, C & E

These alternatives would restrict precommercial thinning in lynx habitat. Ponderosa pine is both more shade-tolerant than larch and less fire resistant. Restricting precommercial thinning would have a similar effect to what's described for western larch but on fewer acres. Some thinning may be allowed under Alternative E if the purpose is to restore fire to the ecosystem.

Table 3-33. Ponderosa pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Ponderosa pine	11,660 acres	48,450 acres	60,110 acres

Alternative D
Alternative D would allow daylight thinning in ponderosa pine, retaining about 80 percent of the winter snowshoe hare habitat. The ecological effects are similar to Alternative D for western larch.

About 11,660 acres would be thinned, giving them a chance to develop into large trees that can survive fire. This restricted approach would not protect all the trees and may not the be the ideal approach, but some would survive into maturity and produce seed, resulting in future generations. Alternative D would help maintain this species on the landscape.

Lodgepole pine
Lodgepole pine *(Pinus contorta)* is the main cover type on about seven million acres in the amendment area. Extensive landscapes of near-pure lodgepole or lodgepole/spruce/fir are common in the eastern and southern half of the amendment area. Lodgepole pine grows larger and mixes readily with western larch, grand fir and western white pine on moister sites in the northern and western portion of the amendment areas.

Lodgepole is a short-lived tree in western Montana and northern Idaho, and long-lived in eastern Montana and the central Rocky Mountains. Lodgepole is fire-adapted, establishing itself on burned areas (Lotan et al. 1985). Stocking can be as high as 10,000 to 40,000 stems per acre. Most lodgepole forests in the Rocky Mountains were established because of fire.

Historically, fire burned more frequently in lodgepole pine than previously believed. It used to be considered that lodgepole forests were merely the result of stand-replacing fires, but research has shown fire-free intervals of only 22 to 50 years in many lodgepole-dominated forests (Lotan et al. 1985), suggesting fire reduced stand densities. This indicates fire plays a role in both establishing and perpetuating lodgepole pine.

The effects of low-intensity fires in lodgepole forests depend on the availability of seed and amount of duff removed. These low-intensity fires removed some trees, allowing others to grow into large trees. Without some disturbance, lodgepole forests become quite dense with small-diameter stems, small crowns and little diversity.

Except for extensive timber harvests in eastern Montana in the 1950s and 1960s, and mountain-pine-beetle salvage harvests in the southeast part of the amendment area in the 1970s and 1980s, fire suppression has resulted in extensive areas of mature lodgepole.

Much of it is susceptible to infestation by mountain pine beetles – large-scale infestations result in conditions favorable to stand-replacing wildfires or succession to shade-tolerant species (USDA FS 1998).

Table 3-34. Lodgepole pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Lodgepole pine	34,550 acres	6,420 acres	40,970 acres

Restoring lodgepole pine old growth
Precommercially thinning young lodgepole has a dramatic effect on their ability to grow to large diameters (Lotan & Perry 1983). Differences of from four to six inches in diameter were observed by the time the trees were 90 years old, depending on whether there were 500 trees per acre or 2,500.

Studies have shown that unless lodgepole is released from suppression when very young, stagnant growth persists after reductions in density. High stand densities reduced crown diameters and changed the distribution of foliage (Bassman 1984). In some situations, precommercial thinning is necessary to grow merchantable trees.

To provide old growth stand conditions, lodgepole requires disturbance to reduce stem densities. About 35,000 acres of lodgepole pine have been scheduled for precommercial thinning to provide for future old growth in lynx habitat – see Table 3-34.

Alternative A, no action
Although not an exact substitute, precommercial thinning can have results similar to low-intensity fires. Alternative A would continue precommercial thinning to develop old-growth lodgepole pine and improve sawtimber yields and product value on up to 34,550 acres in lynx habitat if fully funded.

Alternatives B, C & E
Alternatives B, C and E would defer precommercial thinning on 34,550 acres in lodgepole forests in lynx habitat, until the forests no longer provide winter snowshoe hare forage.

Generally, precommercial thinning would be deferred until the trees are about 45 years old. Allowing high stem densities to persist beyond 45 years can result in high stem densities and with little diversity, producing a landscape out of equilibrium after stand-replacing fire (Shaw 2002).

Delaying thinning until the trees are 45 years old results in tall, skinny trees, with little or no live crown, meaning they have little or no capacity to grow. If they are thinned after age 45, they're easily damaged or felled by snow and wind, and heavy fuels result.

Delaying thinning also allows mountain pine beetles to become active earlier in larger trees, shifting stand structure away from goshawk nesting habitat (Shaw 2002). Any future economic benefits of thinning would not be realized in lynx habitat.

Alternative D
Alternative D would allow precommercial thinning to provide future old growth stand conditions on up to 34,550 acres in the amendment area, if fully funded. Thinning would help add structural diversity to these forests and landscapes.

Table 3-35. Research & genetics precommercial thinning next decade at full funding

	Inside lynx habitat	Outside lynx habitat	Total precommercial thinning
Research	1,450 acres	80 acres	1,530 acres
Genetic tests	220 acres	320 acres	540 acres

Research program
About 1,450 acres would be thinned to complete research studies in lynx habitat if fully funded during the next decade. Most of this research is designed to understand the effects of various thinning methods on tree composition and growth and its effect on wildlife, such as how snowshoe hares respond to various thinning methods.

Genetic resource program
About 220 acres of the 540 acres of genetic test sites are inside lynx habitat – see Table 3-35. Genetic test sites are plantations established to determine the genetic worth of particular families and trees for future breeding programs (Howe et al. 1996). The plantations are thinned after the test trees begin to compete with one another.

Alternative A, for research
Using precommercial thinning for various research objectives would continue on 1,530 acres if fully funded; 1,450 acres are inside lynx habitat. Research objectives, such as spacing trials on timber productivity, effects on snowshoe hare populations and effects on other wildlife, would be met.

Under Alternative A, long-term genetic tests would continue to be implemented according to Regional Tree Improvement Plans on about 540 acres; 220 acres are in lynx habitat.

Alternative B for research
Alternative B would not allow precommercial thinning for research needs. Eliminating research in lynx habitat could prevent us from understand more fully the effects of different precommercial thinning prescriptions on winter snowshoe hare habitat.

Alternative B also would not allow precommercial thinning for genetic tests on the 220 acres in lynx habitat. Although not a large part of the precommercial thinning program, the tests and trials are important in the development of improved planting stock. Restricting precommercial thinning would eliminate the potential to implement established research, designed to evaluate the genetic material in the appropriate environment.

Alternatives C, D & E for research
Alternatives C, D and E would allow precommercial thinning for research needs and for long-term genetic tests; therefore, the effects would be the same as Alternative A.

Summary of precommercial thinning in the stand initiation stage

A variety of vegetation management projects may take place during the stand initiation phase. These projects may or may not reduce winter snowshoe hare habitat, depending on how much vegetation is removed and when.

Some projects don't reduce winter snowshoe hare habitat because they remove little cover or take place when the trees are not considered foraging habitat. Such activities include pruning western white pine to control blister rust, weed and release, cutting Christmas trees and digging landscaping trees for transplant. These activities either have limited effects or may be modified to limit their effects; therefore, they are not discussed further.

Project Record, Forests section provides additional detail.

Precommercial thinning generally does remove winter snowshoe hare habitat. Thinning takes place in thick stands when the trees have grown taller than the average winter snow is deep, when they are providing winter snowshoe hare habitat.

Almost 60,000 acres of precommercial thinning is scheduled to be done each year during the next decade in the amendment area – see Table 3-36. Of that, about 40,000 acres or about two-thirds is inside lynx habitat.

There is no guarantee of full funding. On the average in recent years, funding was received to thin only about 20,000 acres per year in the amendment area – see Table 3-36. Funding reductions affect all acres, not just those scheduled inside lynx habitat. See the *Economics* section later in Chapter 3 and Table K-6 in Appendix K for a discussion of historic average funding.

Table 3-36. Scheduled precommercial thinning allowed by alternative next decade

Precommercial thinning	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Total at historic average funding [1]	*198,270*	*65,880*	*66,400*	*142,350*	*66,400*
Total at full funding	580,960	187,010	188,680	420,910 [2]	188,680
Research	1,530	80	1,530	1,530	1,530
Genetic tests	540	320	540	540	540
Within 200 feet of dwellings	6,360	6,360	6,360	6,360	6,360
Restoration [3]	355,700	123,080	123,080	355,700	123,080
Planted western white pine	70,700 [4]	19,610	19,610	70,700	19,610
Whitebark pine	9,360	250	250	9,360	250
Aspen	6,120	3,070	3,070	6,120	3,070
Western larch	168,440	45,280	45,280	168,440	45,280
Ponderosa pine	60,110	48,450	48,450	60,110	48,450
Lodgepole pine	40,970 [5]	6,420	6,420	40,970	6,420

Acres are those scheduled during the next decade in the amendment area; actual acres could change.

[1] *All other figures are based on full funding – assumes historic average 34 percent of program request* – see the *Economics* section, Table K-6 in Appendix K & the vegetation section of the Project Record

[2] The figure for Alternative D does not include what might be allowed if a broad-scale assessment found winter snowshoe hare forage conditions exceed the historic range.

[3] Restoration = western white pine + whitebark pine + aspen + larch + ponderosa pine + lodgepole, both inside & outside lynx habitat if fully funded

[4] The figure for Alternative A represents only the planted rust-resistant western white pine scheduled to avoid loss of competitive advantage to competition from shade-tolerant trees. Total scheduled western white pine thinning is more than 70,700 acres.

[5] The figure for Alternative A represents only those lodgepole pine forests where thinning would be used to encourage old growth. Total scheduled lodgepole pine thinning is greater than 40,970 acres.

Tables K-1 through K-6 in Appendix K show thinning data by unit.

Effects in the stand initiation stage

Precommercial thinning is the primary vegetation management activity in the stand initiation stage. It can be done to restore and perpetuate rust-resistant western white pine, whitebark pine, aspen, western larch, ponderosa pine and old growth lodgepole pine in the absence of wildfire or other disturbances.

Standard VEG S5 would defer precommercial thinning in winter snowshoe hare habitat in the stand initiation stage. Most, if not all of the precommercial thinning program is scheduled in these young regenerating forests.

Standard VEG S6 would also defer precommercial thinning; however, VEG S6 focuses on lynx habitat in multistoried stages. Very little, if any precommercial thinning is scheduled in multistoried stages; therefore, the effects of this standard would be limited and it is not discussed further.

Alternative A, no action

Under Alternative A, the scheduled precommercial thinning program would not be affected. If full funding were available, up to 580,960 acres of thinning could take place in the amendment area during the next decade – 396,140 acres are in lynx habitat. If the precommercial thinning program were funded similar to historic average levels, up to 198,270 acres may take place during the next decade – see Table 3-37.

Alternative A would allow using precommercial thinning to restore up to 355,700 acres of species in decline to help retain them on the landscape. Thinning trees in dense young stands results in improved health and vigor (Oliver & Larson 1996). Growth would be concentrated on selected trees that have desired characteristics and future value would be improved where commercial harvest is desired. More trees would grow into large mature trees, especially in areas where fire is suppressed.

Alternative B

Under Alternative B, Standard VEG S5 would defer precommercial thinning in winter snowshoe hare habitat in the stand initiation stage, allowing only thinning within 200 feet of administrative sites, dwellings and outbuildings to create a space defensible from fire. This means that precommercial thinning would not take place until after the trees are 45 years old, and in most cases, would not take place at all.

This standard would result in deferring about 68 percent of the scheduled precommercial thinning, leaving 184,820 acres available during the next decade

Table 3-37. Alternatives A & B precommercial thinning next decade

	PCT inside lynx habitat	PCT outside lynx habitat	Total if fully funded	Historic average funding
Alternative A	396,140 acres	184,820 acres	580,960 acres	198,270 acres
Alternative B	2,190 acres	184,820 acres	187,010 acres	65,880 acres

mostly outside lynx habitat. Under the historic average funding, about 65,880 acres would be precommercially thinned during the next decade – see Table 3-37. Research and genetic tests on 1,670 acres would not take place.

If fully funded, restoration thinning on up to 232,620 acres in lynx habitat would be forgone. The delay until young forests no longer serve as winter snowshoe hare habitat has long-lasting consequences, to species that need full sun and are not able to tolerate dense stocking without a significant loss in live crown.

Without reducing stem densities, the ability to keep these species well represented would be seriously impacted. The impact is greatest on planted rust-resistant western white pine, the number one priority for thinning in FS Region 1, because almost three-quarters of the plantations ready for thinning are inside lynx habitat. Generally, the thinning allowed outside lynx habitat would be in drier places, where western white pine, whitebark pine and larch do not grow.

Delayed thinning can substantially increase the fuel loading. Fiber-thinning in previously un-thinned 50-year old lodgepole/larch forests on the Bonners Ferry Ranger District have resulted in considerable fuel loading, even when the material removed was used for pulp down to three inches in diameter. Fuel treatments on these thinned areas averaged $50 per acre (Barry Wynsma, pers. com.).

Alternative C

Under Alternative C, Standard VEG S5 allows vegetation management projects in winter snowshoe hare habitat in the stand initiation stage for research, genetic tests sites and within 200 feet of dwellings and associated outbuildings.

While the range of management activities affected has been broadened, the primary activity affected would be precommercial thinning. Alternative C would result in about 188,680 acres thinned in the next decade if fully funded, of which 3,860 acres would be in lynx habitat. Under historic average funding, only 66,400 acres would be accomplished – see Table 3-38.

The effects of Alternative C would be similar to Alternative B. If fully funded, restoration thinning would be forgone on up to 232,620 acres in lynx habitat.

Alternative D

Alternative D modifies Standard VEG S5 to allow a number of vegetation management projects:

- For a research and genetic test sites

Table 3-38. Alternatives C, D & E precommercial thinning next decade

	PCT inside lynx habitat	PCT outside lynx habitat	Total if fully funded	Historic average funding
Alternatives C & E	3,860 acres	184,820 acres	188,680 acres	66,400 acres
Alternative D	236,480 ‡ acres	184,820 acres	421,300 acres	142,350 acres

‡ For 185,910 acres, only 20 percent of the winter snowshoe hare forage would be removed

- Within 200 feet of dwellings or associated outbuildings
- To restore western larch, aspen, old growth lodgepole pine, ponderosa pine, western white pine and whitebark pine forests
- When a broad-scale assessment has found winter snowshoe hare habitat exceeds the range of historic conditions

Alternative D could result in thinning up to 421,300 acres in the next decade if fully funded; 236,480 acres are in lynx habitat. More acres could be thinned if a broad-scale assessment determines winter snowshoe hare forage conditions exceed the range of historic conditions. Under historic average funding, only 142,350 acres would be thinned – see Table 3-38.

Alternative D would contribute to restoring whitebark pine, aspen, ponderosa pine, western larch, and planted rust-resistant western white pine and old growth lodgepole pine. These species and structures require disturbance early in their life cycles to maintain them on the landscape.

Alternative E

Alternative E is similar to Alternative C, except that it allows precommercial thinning for fuel projects. Some thinning may occur to restore fire to the ecosystem. How many acres are involved is not known. It's most likely to take place in aspen and whitebark pine forests.

Older multistoried stages

Management actions in older multistoried stages

A multistoried structure generally forms as trees grow old and die and new trees regenerate underneath the canopy of older trees. Two older multistoried stages – the *understory reinitiation* and the *old forest multistoried* – can provide winter snowshoe hare habitat (Ruggiero et. al 2000a; John Squires, pers. com.).

In winter snowshoe hare habitat, an overstory layer of large trees grows above dense undergrowth of trees and shrubs with live crowns within the reach of snowshoe hares during winter when the snow is at its average maximum depth.

Some multistoried forests do not provide winter snowshoe hare habitat because the understory is not dense enough, or the understory live crowns are too far above the snow for the hares to reach.

FIA data for Montana was used to gauge how much lynx habitat exists in multistoried stages – for more discussion, see the *Lynx* section. About 1.5 million acres or 16 percent is multistoried and provides some level of winter snowshoe hare habitat – see Table 3-39 here and Table 3-2 earlier in the *Lynx* section. About 75 percent is outside wilderness. It's likely that a similar percentage occurs in the rest of the amendment area, since western Montana is similar to northern Idaho, and eastern Montana is similar to Wyoming, Utah and southern Idaho. Vegetation management projects that may take place in multistoried forests are summarized in Table 3-39 and include:

Precommercial thinning
Precommercial thinning removes some small trees to improve the growing conditions for the remaining trees. Precommercial thinning takes place mostly in the young forests created by regeneration harvest or fires. Little precommercial thinning takes place in multistoried forests. Precommercial thinning can negatively affect snowshoe hare populations (Ruediger et al. 2000).

Understory thinning
Understory thinning, or thinning from below, removes smaller trees growing under taller ones, to remove ladder fuels or to improve the health and vigor of the overstory. Understory thinning may or may not provide commercial products.

Winter snowshoe hare habitat may or may not be directly affected depending on the size of trees removed. Winter snowshoe hare habitat would be affected if the entire

Table 3-39. Multistoried lynx habitat on NF lands in Montana

	Inside wilderness		Outside wilderness		Total	
High density forests	368,000 acres	4%	1,085,000 acres	12%	1,453,000 acres	16%
Low density forests	197,000 acres	2%	819,000 acres	9%	1,016,000 acres	11%
Total	565,000 acres	21%	1,904,000 acres	6%	2,469,000 acres	27%

understory were removed, including the trees within reach of hares. If mid-story trees are removed, some of the winter snowshoe hare habitat may be affected. Some winter snowshoe hare habitat could be removed by skid trails or logging systems.

Commercial thinning
Commercial thinning generally removes mid-story trees to reduce competition with other trees. Limited commercial thinning takes place in multistoried forests. The trees removed have commercial value. Winter snowshoe hare habitat would not be substantially affected because small trees are not removed, except in skid trails.

Even-age harvests
Even-age harvests include clearcuts, seed tree cuts and shelterwood harvests remove mid- and overstory trees with commercial value, to regenerate even-age forests. Clearcutting removes all the trees. Seed tree cuts retain some large trees and shelterwood cuts retain more overstory trees, until seedlings become established.

Typically, all the understory trees are removed; even-aged harvests remove winter snowshoe hare habitat.

Two-age harvests
Two-age harvests are clearcuts, seed tree cuts and shelterwood cuts that retain some overstory trees. They retain structural diversity and result in a two-age stand as an understory of younger trees regenerate. Typically, all the understory trees are typically removed in two-aged treatments; two-age harvests remove winter snowshoe hare habitat.

Uneven-age harvests
Uneven-age harvests remove trees with commercial value either individually or in groups. They maintain a multi-age structure by removing some trees of all sizes and by regenerating the openings.

Uneven-age harvests can either create or remove winter snowshoe hare habitat.

- If understory trees are removed during logging, forage could be lost.
- If openings are created providing space where young trees can grow, forage could be created.

Salvage logging
Salvage logging removes trees that are dead, damaged or dying to recover economic value. Salvage harvest typically results in removing the large overstory trees, but not the small understory trees that make up winter snowshoe hare habitat. Some small trees may be incidentally removed in skid trails or skyline corridors.

Prescribed fire
Prescribed fire removes the understory trees, and sometimes overstory trees as well, depending on the management objective. Prescribed fire may or may not include mechanical treatment such as slashing or understory thinning before burning. Prescribed fires remove understory trees and winter snowshoe hare habitat.

Effects in older multistoried stages

This analysis evaluates the effects of the alternatives on a variety of vegetation management projects that could take place in the multistoried forests. However, the

analysis is qualitative because there is little information on how many of the 1.9 million acres of multistoried lynx habitat outside wilderness are likely to need treatment. Effects on fuel treatments are discussed in the *Fire* section.

Other vegetation standards and guidelines that could affect timber harvest

Several other standards and guidelines may affect the ability to harvest timber in lynx habitat. They vary by alternative, and include:

- *Standard VEG S1:* Vegetation management projects would be restricted in LAUs with 30 percent or more unsuitable habitat. Unsuitable habitat includes areas that are regenerating following timber harvest or fire and the trees or shrubs are too short to provide forage and cover for snowshoe hares during winter. Generally, this stage exists for ten to 30 years after disturbance.
- *Standard VEG S2:* Timber harvest would be restricted in LAUs if it leads to 15 percent or more unsuitable habitat created during the past decade.
- *Standard VEG S3:* Vegetation management projects would be restricted when there is less than ten percent denning habitat in an LAU.
- *Standard VEG S4:* Generally, salvage logging would not be allowed in disturbed areas five acres or smaller. However, when field validation and mapping finds an LAU contains ten percent denning habitat well distributed, small patches may be salvage logged.
- *Guideline VEG G1:* Create winter snowshoe hare habitat where it's scarce or absent.

Alternative A, no action

Under the no-action alternative, no changes would be made to existing plans. Vegetative management projects would not be precluded in multistoried forests except as already precluded in existing plans.

Timber harvest and salvage logging could take place where currently allowed.

Alternative B

Standard VEG S6

Under Alternative B, Standard VEG S6 would not allow precommercial thinning that reduces winter snowshoe hare habitat in multistoried forests. It allows thinning within 200 feet of administrative sites, dwellings and outbuildings to create a space defensible from fire.

Under Alternative B, Standard VEG S6 defers only precommercial thinning or understory treatments. It does not defer prescribed burning, even-age, two-age, uneven-age or salvage harvests.

Table 3-39 on the following page shows which vegetation management projects that reduce winter snowshoe hare habitat in multistoried forests would be limited by Standard VEG S6 under the different alternatives.

Standard VEG S1

Under Alternative B, Standard VEG S1 would limit vegetation management projects when there is more than 30 percent unsuitable habitat in an LAU

Table 3-40. Projects allowed in multistoried winter snowshoe hare habitat under Standard VEG S6

Kind of project	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E†
Precommercial thinning	Yes, where allowed in plans	No, except near structures	No, except near structures or for research	Near structures, for research, for restoring whitebark pine, western white pine, larch, ponderosa pine & old growth lodgepole or when there's an abundance of multistoried winter snowshoe hare forage	Possible to deviate from Guideline VEG G8 with rationale
Understory thinning	Yes	Yes, if commercial No, if non-commercial	Same as above	Same as above	Same as above
Commercial thinning ‡	Yes	Yes	Same as above	Same as above	Same as above
Even-age harvest	Yes	Yes	Same as above	Near structures, to recruit forage in openings or when there's an abundance of multistoried winter snowshoe hare forage	Same as above
Two-age harvest	Yes	Yes	Same as above	Same as above	Same as above
Uneven-age harvest ‡	Yes	Yes	Same as above	To recruit forage in openings	To recruit forage in openings
Salvage ‡	Yes	Yes	Same as above	Near structures, to create openings or to improve or maintain forage	To recruit forage
Prescribed fire‡	Yes	Yes	Same as above	Near structures, to create openings, to improve or maintain forage, or for whitebark pine	Same as above

† Under Alternative E, Standard VEG S6 is dropped and replaced by Guideline VEG G8
‡ Vegetation management projects can take place without reducing winter snowshoe hare forage, depending on where the forage is and where the target trees are. It's likely that under Alternatives C, D and E, some foraging habitat would be removed – these projects would be deferred.

unless a broad scale assessment substantiates different historic levels.

Only a few LAUs (less than 13 percent in FS Region 1) exceed 30 percent, resulting from wildfires that burned large areas (Hillis et al. 2003).

Salvage harvest generally would not be constrained by this standard because removing dead trees does not create unsuitable habitat. The original disturbance created the unsuitable condition.

Standard VEG S2

Under Alternative B, Standard VEG S2 would limit timber harvests if they produced more than 15 percent unsuitable habitat in a 10-year period. About 13

percent of the LAUs in Montana have more than 15 percent unsuitable habitat, mostly resulting from wildfires.

Salvage harvest generally would not be constrained by this standard.

Standard VEG S3
Under Alternative B, Standard VEG S3 restricts projects in LAUs with less than ten percent denning if they remove vegetation from areas with the highest potential to develop denning habitat.

Generally, denning habitat is not likely a limiting factor in the amendment area (Hickenbottom et al. 1999). Where there's not enough, projects would be precluded, which would primarily affect salvage logging.

Standard VEG S4
Under Alternative B, Standard VEG S4 generally restricts salvage logging where trees have been killed in pockets smaller than five acres. However, it doesn't apply when an LAU has been mapped and field-verified to contain ten percent denning habitat.

It's likely many LAUs provide enough denning habitat, but some salvage may be precluded.

Guideline VEG G1
Under Alternative B, Guideline VEG G1 says projects should be planned to develop winter snowshoe hare habitat where it's lacking. A variety of projects could be done where there's less than 30 percent unsuitable habitat, or less than 15 percent created by timber harvest.

Summary for Alternative B
Alternative B may defer timber projects in some areas because of Standards VEG S1, VEG S2 and VEG S3. Guideline VEG G1 encourages vegetation management, including timber harvest to create winter snowshoe hare habitat.

It's likely there would be no change in overall timber harvest outputs, but there may be changes in what material is harvested and where. The effect of Alternative B on salvage projects is likely to be limited because it's likely many LAUs provide ten percent denning.

Alternative C

Standard VEG S6
Under Alternative C, Standard VEG S6 would not allow any vegetation management projects that reduce winter snowshoe hare habitat in multistoried forests but those:

- Within 200 feet of administrative sites, dwellings or outbuildings
- For research studies

This could increase insect and disease outbreaks. Understory trees are not distributed uniformly, so it may be possible to remove trees without affecting foraging habitat.

Standard VEG S6 also would defer prescribed fire and precommercial thinning to restore whitebark pine in some places. Whitebark pine treatments are planned on about 60,000 acres during the next decade.

It's not known how many of those areas provide winter snowshoe hare habitat. It's likely some areas would not be treated

due to this standard, further contributing to the decline of whitebark pine.

It's difficult to determine what effect this standard would have on timber sales. It's likely some activities would not occur in some places or would be deferred because of this standard.

Most timber harvest takes place on the suitable timber base, where timber harvest is allowed under existing plans. About half of the multistoried habitat that could provide winter snowshoe hare habitat is in the suitable timber base.

Standard VEG S1
Under Alternative C, Standard VEG S1 applies to multiple LAUs. Some projects that create more than 30 percent unsuitable habitat may be deferred but only where large fires burned, such as the 1988 Yellowstone and Canyon Creek fires (Hillis 2003).

Standard VEG S2 dropped, Guideline VEG G6 added
Under Alternative C, Standard VEG S2 is dropped and the management direction added in Guideline VEG G6. Guideline VEG G6 would have limited effect on timber projects both because it's a guideline and because few LAUs exceed 15 percent unsuitable caused by timber harvest. It generally would not affect salvage logging.

Standards VEG S3 & VEG S4
Alternative C includes the same version of Standard VEG S3 as Alternative B. It also includes Standard VEG S4, which would allow salvage logging on patches smaller than five acres next to homes.

Generally, these standards would not limit timber or salvage projects because it's likely many LAUs provide enough denning habitat, but some projects could be deferred or dropped.

Guideline VEG G1
Under Alternative C, Guideline VEG G1 has been changed to encourage projects in the stem exclusion stage.

Summary for Alternative C
Alternative C may defer timber projects in some areas because of Standards VEG S1 and VEG S6 and Guideline VEG G6. Guideline VEG G1 encourages projects that create winter snowshoe hare habitat.

It's likely there would be no change in overall timber harvest outputs, but there may be changes in what material is harvested and where. The effect of Alternative C on salvage projects is likely to be limited because it's likely many LAUs provide ten percent denning.

Overall, fewer timber projects are likely to be deferred under Alternative C because Standard VEG S1 is less constraining.

Alternative D

Standard VEG S6
Under Alternative D, Standard VEG S6 would allow vegetation management projects that reduce winter snowshoe hare habitat in multistoried forests:

- Within 200 feet of administrative sites, dwellings or outbuildings
- For research studies
- To restore whitebark pine
- To restore or maintain western white pine, western larch, ponderosa pine so long as 80 percent of the winter snowshoe hare habitat is retained

- To develop future old growth characteristics in lodgepole pine
- To improve or maintain winter snowshoe hare habitat in the long term
- When a broad scale assessment determines that the amount of multistoried winter snowshoe hare habitat exceeds what's expected in the normal range of historic conditions.

Other projects would be deferred until forests no longer provide foraging habitat. Some projects would be allowed if they improve or maintain forage habitat in the long term.

Multistoried forests include a variety of conditions. Some forage habitat is likely to be growing out of reach of snowshoe hares – removing these trees under these conditions and initiating a new crop of trees could prolong forage.

Under Alternative D, it's difficult to determine the effect Standard VEG S6 would have on timber programs. Alternative D allows vegetation management projects under a variety of circumstances. One condition allows projects that improve forage over the long term – timber harvest could be used to create openings for new forage to develop. Still, it's likely some vegetation management projects would not take place because of this standard.

Alternative D would not interfere with efforts to restore whitebark pine. It would allow projects that restore and maintain this species.

Standard VEG S1
Under Alternative D, Standard VEG S1 applies to a sub-basin or isolated mountain range. The standard is likely to constrain vegetative management projects that create unsuitable habitat only in areas that had very large fires such as the 1988 Canyon Creek and Yellowstone fires (Hillis 2002).

Standard VEG S2 & Guideline VEG G6 both dropped
Alternative D drops Standard VEG S2 and Guideline VEG G6 as well, so they have no effect.

Standard VEG S3
Alternative D modifies Standard VEG S3 to let project design to mitigate any effects in denning habitat. Projects would still need to leave some overstory and enough coarse woody debris to provide den sites. Generally, salvage projects could be designed to meet these objectives.

Standard VEG S4 dropped, Guideline VEG G7 added
Under Alternative D, Standard VEG S4 is dropped and the management direction added in Guideline VEG G7. Retaining the small patches of dead trees would be considered, but salvage harvest could take place if there is reason to do so.

Summary for Alternative D
Alternative D may defer timber projects in some places because of Standards VEG S1 and VEG S6. Alternative D is not likely to affect timber projects, except even-age or two-age harvests where large fires have occurred.

It's likely there would be no change in overall timber outputs, but there may be changes in what material is harvested and where. Alternative D would have limited effects on salvage harvest.

Overall, fewer timber projects are likely to be deferred under Alternative D because Standards VEG S1 and VEG S6 are less constraining.

Alternative E

Standard VEG S1
Under Alternative E, Standard VEG S1 applies to multiple LAUs. Some projects that create more than 30 percent unsuitable habitat may be deferred but only where large fires had burned. The standard would not apply to timber harvest used to meet fuel treatment objectives.

Standard VEG S2 & Guideline VEG G6 both dropped
Alternative E drops Standard VEG S2 and Guideline VEG G6, the same as under Alternative D, so they have no effect.

Standard VEG S3
Under Alternative E, Standard VEG S3 would require leaving some overstory and enough coarse woody debris to provide den sites if denning habitat was lacking. It would not apply to salvage logging done for fuel treatment.

Standard VEG S4 dropped, Guideline VEG G7 added
Under Alternative E, Guideline VEG G7 would encourage retaining small patches of dead trees, but salvage harvest could take place with adequate rationale.

Standard VEG S6 dropped, Guideline VEG G8 added
Under Alternative E, Standard VEG S6 is dropped and the management direction added in Guideline VEG G8. The guideline recommends retaining winter snowshoe hare habitat in multistoried forests but allows timber harvest where understory forage is lacking.

Winter snowshoe hare habitat would have to be considered when designing timber projects, but it could be removed if reasons can be documented.

Summary for Alternative E
Alternative E has similar effects on timber harvest to Alternative C. Standard VEG S1 and Guidelines VEG G6 and VEG G8 may defer them in some areas, but Guidelines VEG G6 and VEG G8 also encourage projects creating winter snowshoe hare habitat where it's lacking. Timber harvest would not be precluded if done to meet fuel treatment objectives developed through a collaborative process.

It's likely there would be no change in overall timber harvest outputs, but there may be changes in what material is harvested and where. Alternative E also would not constrain fuel treatment, so it would have less effect on timber outputs than Alternative C.

The effects of Alternative E on salvage projects are similar to Alternative D.

Cumulative effects

Alternative A

On species of decline

Disturbance processes such as fire would continue to shape the landscapes of the northern Rockies. Fire suppression would also continue, resulting in forests with too many trees and continuing the change in species composition from those that depend on fire to those that do not. Efforts to restore species of decline would continue through reforestation, thinning and prescribed fire, cumulatively improving conditions over time.

On timber program

Past, present, and reasonably foreseeable actions listed in Appendix L have reduced the area available for timber harvest. Other tools, such as prescribed fire would be used to meet resource objectives in these areas.

Alternatives B, C, D & E

On species of decline

Like Alternative A, the natural disturbance processes and fire suppression would continue. Using fire would be encouraged to restore ecosystems. The tools used to restore tree species in decline would be more limited; it's likely that some would experience further decline. However, restoration could take place outside lynx habitat or in areas that do not provide winter snowshoe hare habitat. More tools would be available under Alternative D, so the extent of effect would not be as great.

On timber program

Past, present, and reasonably foreseeable actions listed in Appendix L have reduced the area available for timber harvest. Other tools, such as prescribed fire would be used to meet resource objectives in these areas. The amendment would have a limited cumulative effect on the timber program. There could be a change in the type of material harvested and where.

Plants

Affected environment

The amendment area contains populations of 216 rare plant species – see Appendix J. They include one federally listed species, one candidate for listing and 214 FS sensitive (USDA FS 1999 a & b) or BLM special status plant species (USDI BLM 2001 & 2002).

These plants occur infrequently and are generally found in specific habitats. Many are found in wet areas because they need more moisture to survive. Some are found in older stands of lodgepole pine, grand fir or subalpine fir. A few are associated with young regenerating stands, and some require periodic disturbance to maintain their populations.

- Ute ladies'-tresses *(Spiranthes diluvialis)* is a federally listed threatened species. It grows in some of the shallow, braided wetlands and seep areas in Montana and Idaho (Heidel 1997).
- Slender moonwort *(Botrychium lineare)*, a species proposed for federal listing (USDA FWS 2001), has known populations in Montana and Idaho in open areas such as roadsides or other areas dominated by low-growing plants.
- Although *whitebark pine* is not a TES (threatened, endangered or sensitive) plant, whitebark pine is in steep ecological decline due to a number of threats to the species – fire suppression, white pine blister rust and mountain pine beetles. Thinning can imitate some of the effects of the fires that historically favored whitebark pine over its competitors in mid- and high-subalpine zones after stand-replacing wildfire.

Effects

The lynx amendment would add restrictions and encourage such activities as wildland fire use at the programmatic level. It would have no direct effects.

It's difficult to determine indirect effects of programmatic direction to individual populations or habitat niches except on a very broad scale. Therefore, this analysis will evaluate potential effects at the broad scale from the restrictions imposed and activities encouraged, focusing on the direction for vegetation.

Alternative A, no action

Under the no-action alternative, the management direction in existing plans for threatened, endangered and sensitive species plants would remain in place. Current plans require site-specific analysis before projects can be implemented, so any effects on TES plants would be subject to future analysis.

Alternative B, the Proposed Action

Vegetation objectives

In all the action alternatives, Objectives VEG O1 through VEG O4 describe managing vegetation based on historical succession and disturbance processes and encouraging the development of snowshoe hare habitat, as desired future conditions.

Using historic succession and disturbance regimes, including fire, to restore ecological processes should help create a dynamic array of habitat types distributed across the landscape for TES plants.

Vegetation standards

Under Alternative B, Standards VEG S1 through VEG S6 limit the location or extent of vegetation management projects.

Generally, these limitations would not adversely affect TES plants because they constrain projects more than existing plans.

Standards VEG S5 & VEG S6

Under Alternative B, Standards VEG S5 and VEG S6 would prohibit precommercial thinning in lynx habitat, but would allow thinning to treat fuels within 200 feet of dwellings.

Prohibiting precommercial thinning would not have detrimental effects on the habitat types or ecological communities upon which any TES plants depend, and may prove beneficial to some in the long run. Allowing precommercial thinning with 200 feet of dwellings would not substantially affect any TES plants or habitat.

Young regenerating forests

In young regenerating forests, limiting thinning could help diversify habitats. Adverse effects on plants are the greatest when the thinning is heavy. Generally, light thinning has no effect, and sometimes if an underburn follows light thinning, the effect is beneficial.

Older multistory forests

In older multistory forests, plants often become established in the gaps created when overstory trees die or otherwise no longer fully occupy their growing space.

Such plants can be characterized by their ability to establish and grow in reduced sunlight.

Restoring whitebark pine
Returning historic fire regimes would be the most successful way to restore whitebark pine, but difficult to implement. Current restoration efforts rely on thinning and precommercial thinning in subalpine fir forests to mimic the effects of fire. Precommercial thinning could not be used under Alternative B, but prescribed burning could.

Therefore, Alternative B may result in a reduced ability to plan and implement whitebark pine restoration projects. Losing precommercial thinning as a tool would affect the ability to manage for the species across its range.

Grazing
Under Alternative B, Objective GRAZ O1 and Standards GRAZ S1 through S4 would limit where livestock grazing could take place.

Many of TES plants in the amendment area depend on riparian areas, so the restrictions on livestock grazing may prove beneficial to them in the long term. Proposed grazing management in *shrub-steppe* (dry places where grasslands are mixed with shrubs often including sagebrush) and wet areas would help recreate historic conditions.

Human uses
Under Alternative B, Objectives HU O1 through HU O6 and Standards HU S1 through HU S3 would limit the amount of disturbance allowed from special uses, mineral exploration and development. Any ground-disturbing activity that removes vegetation or soil, or fragments habitat, can affect TES plants – Alternative B should reduce these impacts.

Ute ladies'-tresses
Beneficial effects on Ute ladies'-tresses may result in the long term if historic succession and disturbance regimes are restored. The grazing direction would benefit this riparian-dependent species.

Slender moonwort
Beneficial effects may accrue to slender moonwort from the protections provided to young regenerating forests.

Alternative C

The effects of Alternative C are likely to be mostly beneficial to most TES plants and similar to Alternative B, particularly for grazing and human uses.

Standards VEG S5 & VEG S6
Under Alternative C, Standards VEG S5 and VEG S6 restrict all vegetation management projects, not just precommercial thinning. Research and treating fuels close to dwellings would be allowed.

Effects on TES plants would be minimal because of the minimal extent of the projects. Such projects already take place under existing plans; few TES plants are associated with the young regenerating forests where projects would take place.

Alternative C would not allow vegetation management including prescribed burning to help restore whitebark pine, and so would result in a reduced ability to do whitebark pine restoration projects.

Alternative D

The effects of Alternative D are likely to be mostly beneficial to most TES plants and similar to Alternatives B and C, particularly for grazing and human uses.

Standards VEG S5 & VEG S6

Under Alternative D, Standards VEG S5 and VEG S6 would restrict all vegetation management projects, not just precommercial thinning.

Projects would be allowed in aspen, and to release larch, ponderosa pine and white pine by daylight thinning removing no more than 20 percent of the forest cover. Research projects and treating fuels close to dwellings also would be allowed.

These projects in young regenerating forests would not substantially affect TES plants; few TES plants occur where most projects would take place.

Under Alternative D, Standard VEG S6 would also allow projects in multistoried stands that maintain or improve lynx habitat. Projects could include uneven aged management, salvage or prescribed fire. Site-specific analysis for TES plants would be conducted before any projects could take place.

Standard VEG S6 would allow thinning and burning in whitebark pine, so restoration efforts would not be inhibited.

Alternative E

The effects of Alternative E are likely to be mostly beneficial to most TES plants and most similar to Alternative C, particularly for grazing and human uses even though management direction for grazing is changed from standards to guidelines.

Standards VEG S5 & VEG S6

Under Alternative E, Standard VEG S5 would allow vegetation management projects to treat fuels and restore fire to the ecosystem.

Standard VEG S6 is dropped and replaced with a less restrictive guideline, Guideline VEG G8. Projects may occur in multistoried winter snowshoe hare habitat if reasons can be documented. The guideline encourages projects to maintain or improve forage conditions.

Alternative E is not expected to have any major effect on TES plant habitat. Site-specific analyses would be conducted for TES plants before any projects could take place.

Cumulative effects

Alternative A
The past, present and reasonably foreseeable actions listed in Appendix L have generally benefited threatened, endangered, proposed and sensitive plants by limiting disturbance.

Alternatives B, C, D & E
The lynx amendment, in addition to the past, present and reasonably foreseeable actions listed in Appendix L, would continue to benefit threatened, endangered, proposed and sensitive plants. The amendment would incorporate landscape considerations into project planning, and could further limit disturbances that could affect plants especially in riparian habitats.

Alternative C could result in the continued decline of whitebark pine in some areas because the use of prescribed fire and thinning would be precluded in winter snowshoe hare habitat. Restoration activities outside winter snowshoe hare habitat could continue.

Range

Affected environment

An active grazing allotment is a place where a term grazing permit is in effect and where livestock grazing is expected to occur most years. Depending on how the allotment is classified and the language in the term grazing permit, this may consist of either cattle or sheep, or occasionally both. In general, the season of use extends from early June to late September, although this varies depending on elevation, plant communities and management requirements.

The amendment area contains 3,751 federal grazing allotments. Of these, 1,765 or 47 percent contain habitat suitable for lynx, and 1,633 of these are active – see Table 3-41. Table K-7 in Appendix K shows a breakdown by administrative unit. The Project Record contains more data and background information.

The analysis of active grazing allotments containing lynx habitat shows that:

- 38 percent have less than a quarter of their acreage in lynx habitat
- 32 percent have more than a quarter but less than half of their acreage in lynx habitat
- 29 percent have more than half of their acreage in lynx habitat
- 15 percent lack management strategies similar to the LCAS.

Table 3-41. Grazing allotments overlapping lynx habitat

Number of allotments	3,751
Allotments with lynx habitat	1,765
Active allotments with lynx habitat	1,633
Active allotments with less than 25 percent lynx habitat	622
Active allotments with from 25 to 50 percent lynx habitat	530
Active allotments with more than 50 percent lynx habitat	481
Active allotments with lynx habitat with management strategies similar to the LCAS	1,384

Effects

Livestock grazing can affect lynx in two main ways.

- Livestock grazing has contributed to a decline in aspen (USDA FS 1998). Aspen provide snowshoe hare habitat, and are often associated with riparian areas (Ruediger et al. 2000).
- Livestock grazing may change the structure or composition of shrub-steppe habitats, changing their ability to support lynx and its prey (USDA FS 1998). Shrub-steppe habitats provide forage for lynx prey, as well as cover for lynx movement (Ruediger et al. 2000).

Under term grazing permits, livestock is managed according to the objectives, standards and guidelines in the existing plan. Objectives describe desired conditions for range management. Standards and guidelines provide sideboards for grazing, so the short-term effects are within limits that make it possible to achieve the long-term objectives.

Standards and guidelines may include restrictions about the length of the grazing season, allowable use and residual stubble height. Annual management is specified in the annual operating instructions to the permittee.

Alternative A, no action

The no-action alternative would have no effect on the livestock grazing policies of the agencies in the amendment area. Current livestock grazing practices would not change on federal grazing allotments.

Alternatives B, C, D & E

The Proposed Action includes one objective and five standards about managing livestock grazing to provide for lynx habitat needs – see Chapter 2, Table 2-1. These are Objective GRAZ O1 and Standards LINK S2, GRAZ S1, GRAZ S2, GRAZ S3 and GRAZ S4. From a grazing standpoint, there are no differences between Alternatives B, C, and D. Although these five standards are replaced by guidelines in Alternative E, the effects would be substantially the same.

About 85 percent of the active grazing allotments with lynx habitat already have management direction that provides similar protection to what's proposed in this amendment – see Appendix L. On BLM lands, the Healthy Rangeland Initiative (43 CFR 4180.1(e)(8)) provides guidance for managing healthy, productive and diverse populations of native plants. Many existing plans have been amended to include such direction as INFISH which applies to FS units west of the Continental Divide, and PACFISH, which applies to FS and BLM units with anadromous fish.

Such direction includes requirements for maintaining and limiting livestock use in

riparian areas. It generally provides enough direction to manage grazing so it does not adversely impact lynx habitat – little change would be needed to meet the standards proposed in this amendment.

For the 15 percent of active allotments in lynx habitat whose existing plans do not contain similar management direction – all east of the Continental Divide – the Proposed Action and its alternatives would add direction to make sure livestock grazing management would maintain or enhance lynx habitat.

In turn, the Proposed Action and its alternatives would have only minimal effect on livestock grazing operations. In specific instances where a potential exists for negative interactions with livestock, this could result in a need to intensify livestock management. In most cases, this would likely consist of changing the timing, intensity, duration or frequency of livestock use in a specific area. In a very few cases, structural improvements like fences could be required to make sure livestock could be managed appropriately.

Cumulative effects

Alternative A
The past, present and reasonably foreseeable actions listed in Appendix L have cumulatively limited or restricted where or how livestock grazing can occur, especially west of the Continental Divide.

Alternatives B, C, D & E
The lynx amendment, in addition to the past, present and reasonably foreseeable actions listed in Appendix L, would further limit or restrict where grazing can occur, extending the restrictions to east of the Continental Divide.

In areas west of the Continental Divide there would be limited cumulative effects because most of the management direction proposed is already included in existing plans. East of the Continental Divide, some change in livestock management may be necessary, but the amendment does not preclude livestock management.

Recreation

The Northern Rockies has some of the most pristine and scenic wild lands in the United States. The area receives several million visitors in all seasons of the year because of its beauty and uncrowded backcountry (USDA FS 1998).

This analysis focuses on effects on winter recreation, because the alternatives would affect primarily winter activities. Recreational facilities designed for summer use have very little effect on lynx (Ruediger et al. 2000, p 2-9). Developing or expanding sites such as developed campgrounds and amphitheaters would need to consider movement needs for lynx, but the amendment would not preclude their development or expansion.

Special-use permits

People use public lands in many different ways. The agencies require specific approval for many of these uses. Normally public lands are not made available if needs can be met on nonfederal lands.

Each year, the FS and BLM receive thousands of applications from people who want to use public lands for agriculture, outfitting and guiding, recreation, cabins, lodges, ski areas, telecommunication, research, photography and video productions, water transmission lines and road and utility rights-of-way.

What is a special-use authorization?
A special-use authorization is a legal document, such as a permit, lease or easement that allows occupancy, use, rights or privileges on NF or BLM land. The authorization is granted to named person(s) for a specific use of a certain piece of land for a given period.

Travel plans

Management direction for winter recreation comes from the existing plans. Generally, they identify where motorized and non-motorized use may occur during what seasons, and they distribute lands into various allocations limiting and directing how it can be used.

About 55 percent of the lynx habitat in the amendment area is in non-development allocations, which include wilderness areas, wilderness study areas, proposed wilderness and roadless areas – see Table 3-1. Motorized use is not allowed in the more than five million wilderness-area acres of lynx habitat. Motorized winter recreation may be allowed in some roadless areas or wilderness study areas. FS and BLM units produce *access* and *travel guides* or *maps*. These maps usually include information about open and closed roads or trails and areas with travel restrictions.

Definitions

Designated over-the-snow routes
Designated over-the-snow routes are routes managed under permit, agreement or by the agency, where use is to some extent encouraged either by on-the-ground markings or by publication in brochures, recreation opportunity guides or maps (other than travel maps), or in electronic media produced or approved by the agency. Routes may be marked on the ground with blue or orange diamonds, bamboo wands, blazes or difficulty markers.

Both groomed and the routes identified in outfitter and guide permits are designated by definition.

Groomed routes
Groomed routes are designated over-the-snow routes on which the snow surface is packed, leveled or scarified (with or without set tracks) by equipment towed behind a snowmobile or snow-cat. Businesses and groups do most of the grooming. Snowmobile or cross-country ski clubs often obtain permission through permits or agreements to groom certain winter trails. Snow roads maintained by permitted snow-cat tours are considered groomed routes.

Designated play areas
Designated play areas are places specifically identified for winter recreation, such as tubing or snowmobiling, but not including developed ski areas.

Routes & areas open, but not designated
Many routes and areas are identified on travel maps as open for winter use, but their use is not encouraged in any way. The routes are not marked on the ground; they are not identified in brochures or other media, except the travel plan map; they are not groomed; they are not under permit or agreement. Some of these routes and areas are routinely used; others are never accessed. The amendment does not apply to routes and areas open to winter use, but not designated.

Areas of consistent snow compaction
An area of consistent snow compaction is a place generally covered with snow during winter that's used enough to compact the snow so that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after snowfall, within 48 hours. Such places can be areas or linear routes.

Compaction may be caused by any human activity. Areas are generally found near snowmobile or cross-country ski routes, in the nearby openings openings, parks and meadows, or near ski huts, plowed roads or winter parking areas.

Examples include:

- Some of the consistently used routes that are open for public use, but not groomed or designated;
- Sledding or snow play areas close to plowed roads;
- Helicopter landing sites regularly used for heli-skiing;
- Ends of the snow roads used for snow-cat tours; and
- Small lakes with little wind scour where people go ice fishing regularly.

Affected environment

Over-the-snow recreation

Snowmobile use has increased on federal lands over the past several years. Nationally, snowmobile use grew 34 percent from 1988 to 1995 (USDA 1997), much faster than the overall population. Snowmobiling is the second most popular winter sport (Cordell 1999). Increased use has lead to increased demands for expanded routes.

Table 3-42 shows the trend in the number of registered snowmobiles in amendment area states. This information is useful in gauging the popularity of snowmobiling, an outdoor activity for which precise estimates of use over time are difficult to obtain. The data indicates an upward trend in all states.

Snowmobile technology has changed rapidly in recent years, making larger, more powerful and quieter machines available. These new machines let people access previously inaccessible backcountry.

Yellowstone National Park attracts thousands of winter visitors every year. Much of this use spills over onto adjacent NFs (BBER 1994; BBER 1998), particularly the Targhee and Gallatin NFs, which along with the Bridger-Teton NF reported the highest levels of snowmobiling in the amendment area.

Routes & areas

People use snowmobiles, snow cats, snowshoes, cross-country skis and dog sleds on winter trails.

More than 15,000 miles of over-the-snow routes lie within the amendment area. About 13,000 miles of these trails are on public lands managed by the FS and BLM; about 8,000 miles are designated over-the-snow routes in lynx habitat. About 4,500 miles in lynx habitat are groomed in any year; the remaining 3,500 miles are designated, ungroomed routes. See Table 3-43 on the following page. Table K-8 in Appendix K contains information by unit.

Table 3-42. Growth in number of snowmobiles registered by state

	Registered snowmobiles		Average growth	
	1989 – 1991	2000 – 2001	Registered snowmobiles	State population
Idaho	22,300 in 1989	47,500 in 2000	7.1%	2.5%
Montana	15,100 in 1991	24,600 in 2001	5.0%	1.2%
Utah	12,800 in 1990	29,400 in 2001	7.9%	2.6%
Wyoming	15,300 in 1989	18,200 in 2000	1.6%	0.8%

Data from Idaho Department of Motorized Vehicles (2002); Montana Department of Fish, Wildlife & Parks (Walker 2002); Utah State Parks & Recreation Department (Hayes 2002); and Wyoming State Parks & Trails Department (Rapp 2002)

Table 3-43. Miles of designated & groomed winter routes & designated play areas

	NF lands				BLM lands		
	Idaho	Montana	Utah	Wyoming	Idaho	Utah	totals
Miles designated over-the-snow routes	7,250 mi	4,225 mi	125 mi	1,775 mi	50 mi	0	13,425 mi
Miles designated over-the-snow routes in lynx habitat	4,075 mi	2,725 mi	125 mi	1,050 mi	25 mi	0	8,000 mi
Average miles groomed/ year in lynx habitat	1,800 mi	1,680 mi	125 mi	875 mi	25 mi	0	4,500 mi
Designated play areas in lynx habitat	0	4 in 4,050 ac	0	0	0	0	4 in 4,050 ac

Miles and acres rounded to the nearest 10

In the year 2000, about 3,500 miles of snowmobile trails were groomed in Idaho and Montana, 2,100 miles in Wyoming and 120 miles in Utah – this includes routes outside federal lands, but within the amendment area perimeter (Buster, pers. com. & Cook, pers. com.).

Which routes are groomed changes from year to year depending on snow conditions and funding.

In the amendment area, money to pay for grooming snowmobile trails comes from state snowmobile registration funds and a small percentage of gasoline taxes. Wyoming gets some more money from winter trail-use fees.

Since 1990, the total miles of groomed snowmobile trails have remained fairly stable, and for the next five years it's expected the trend will remain flat, because the amount of money available is not likely to increase substantially, although grooming costs are increasing (Buster, pers. com. & Cook, pers. com.).

Outfitter permits

A total of 359 permits or agreements authorize winter recreation in the amendment area – see Table 3-44. Of these, 338 – 94 percent – authorize activities in lynx habitat. See Table K-9 in Appendix K for a breakdown by unit.

The Idaho Panhandle and Targhee NFs in Idaho, the Gallatin, Lewis and Clark and Lolo NFs in Montana, and the Bighorn, Bridge-Teton and Shoshone NFs in Wyoming have the most permits and

Table 3-44. Number of recreation special use permits & agreements

	NF lands				BLM lands		
	Idaho	Montana	Utah	Wyoming	Idaho	Utah	totals
Recreation permits & agreements	735	1114	24	849	0	0	2722
Winter recreation permits & agreements	86	121	2	150	0	0	359
Winter recreation permits & agreements in lynx habitat	77 - 90%	115 - 95%	2 –100%	144 - 96%	0	0	338 - 94%

agreements authorizing winter recreation in lynx habitat. The BLM has none.

Winter outfitters and guides provide a service to people who lack the skills or equipment to participate in winter activities, such as snowmobiling, cross-country or helicopter skiing, and late winter/early spring big game hunting. They provide jobs and income to many small rural western communities.

The number of outfitter and guide permits and their level of use has remained relatively steady over the past decade.

Generally, new permits or increases in service-days have been issued only when existing permits terminate, or when other outfitters decrease their permitted service-days.

A decade ago there was very little outfitted use during winter. Traditionally outfitters in the Northern Region offered hunting trips. Over the past five to ten years, public demands for family-oriented vacations have increased and the availability of game animals has decreased (Chris Ryan, pers. com.).

Outfitters have responded by diversifying their businesses and changing the season-of-use in their permits. This has caused an increase in outfitted snowmobiling, cross-country skiing, etc., during the last decade. However, the change in season-of-use has not resulted in major increases in overall outfitter-guide use.

Effects on over-the-snow recreation

The Proposed Action and alternatives represent programmatic decisions; therefore, they would have no direct effects. Any direct effects would occur later at the project level, when site-specific decisions were made. Any effects identified in this analysis would be indirect effects, which would occur later as an indirect result of this action.

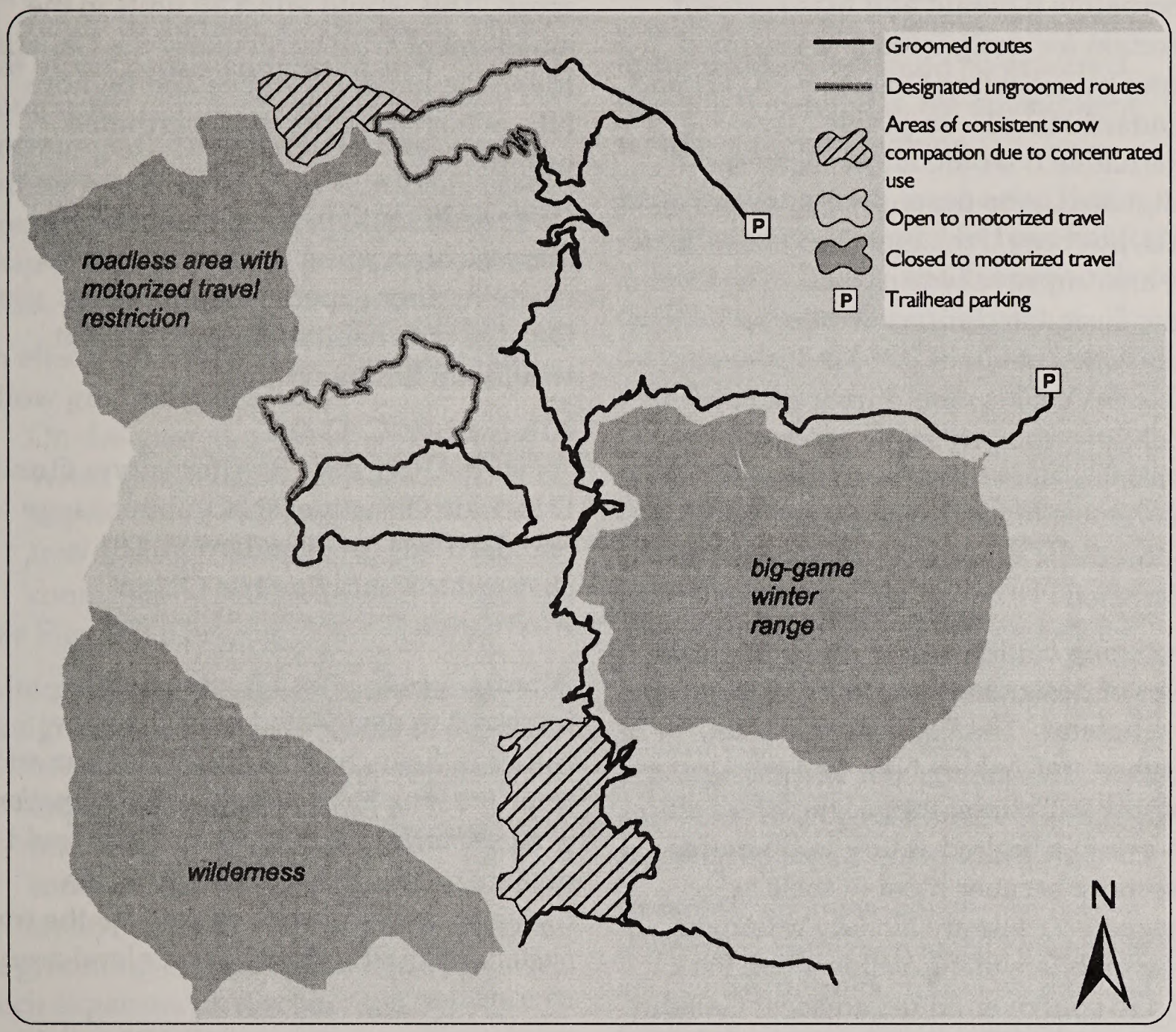
Alternative A, no action
Under the no-action alternative, winter access and use, and outfitter-guide operations on NF and BLM lands would be managed under existing plans. Decisions related to access and issuing new or existing permits, would continue to be made at the local level.

Grooming winter trails is likely to remain at current levels for at least the next five years because the amount of money available for grooming is not likely to increase substantially (Jeff Cook, pers, com.). To increase user satisfaction, grooming would need to increase later in the decade to meet the continuing increase in demand. If this happens, at the end of the decade, groomed routes in lynx habitat may increase above the current 4,500 miles.

The Gallatin, Targhee and Bridger-Teton NFs would continue to receive the most snowmobile use. Snowmobilers who visit Yellowstone National Park would continue to spend multiple days on adjacent NFs.

Public demand for outfitter services would continue to increase, and outfitter business growth would likely follow current trends. Outfitters could change their services toward winter use – they could groom more trails and increase the number of winter trips.

Figure 3-6. Over-the-snow recreation



Alternative A	Alternative B	Alternatives C, D & E
Does not close any areas now open to winter or off-trail use	Same as Alternative A	Same as Alternative A
Grooming could expand based on direction in existing plans	Grooming could expand on designated ungroomed routes	Grooming could expand on designated ungroomed routes & in areas of consistent snow compaction
Designated ungroomed routes could expand based on direction in existing plans	Designated ungroomed routes could <u>not</u> expand	Designated ungroomed routes could expand in areas of consistent snow compaction

This is <u>not</u> how snowmobile & cross-country ski routes are shown on visitor maps

Alternative B, the Proposed Action
Alternative B would add management direction for designated and groomed routes by including Objective HU O1 and Standard HU S1 – see Table 2-1. Alternative B would allow increases in designated over-the-snow routes in an LAU, but only if the increases consolidate use and improve lynx habitat. The level of these designated routes would be maintained at about 8,000 miles – see Table 3-43. This would limit managers' flexibility when trying to accommodate increasing demands, because the limits for trail relocations or adjustments would be imposed *at a single LAU*, basically one watershed.

Grooming could expand on about 3,500 miles of designated ungroomed routes in lynx habitat. The Flathead, Gallatin, Targhee and Ashley NFs, and the Upper Columbia/Salmon unit of the BLM, all have only a limited ability to do more grooming because most of their designated trails are already groomed. Snowmobilers using Yellowstone Park tend to spill over on the adjacent Gallatin and Targhee NFs – see Appendix K.

New or expanded special use authorizations or agreements in lynx habitat would be limited to existing designated over-the-snow routes and areas. This would affect all units in the amendment area, particularly the Gallatin, Idaho Panhandle, Targhee and Bighorn NFs, which have the most permitted outfitters.

Under Alternative B, use would likely increase on existing designated routes, changing user experience somewhat. Outside lynx habitat, the amendment would not limit anything.

Alternatives C, D & E
As with Alternative B, Alternatives C and D include Objective HU O1, but change Standard HU S1. Standard HU S1 is changed to Guideline HU G11 in Alternative E.

Alternatives C, D and E would allow increases in designated over-the-snow routes if the increases consolidate use and improve lynx habitat *in a fixed combination of immediately adjacent LAUs*. This would give managers more flexibility when trying to accommodate changes to the trail system by giving them a larger land area to consider.

As with Alternative B, grooming could expand on designated over-the-snow routes, currently about 3,500 miles.

Alternatives C, D and E would increase

Table 3-45. Designated over-the-snow routes available for future grooming

	Idaho	Montana	Utah	Wyoming
Miles designated over-the-snow routes	7,250 mi	4,225 mi	125 mi	1,775 mi
Miles designated over-the-snow routes in lynx habitat	4,075 mi	2,725 mi	125 mi	1,050 mi
Average miles groomed per year in lynx habitat	1,800 mi	1,680 mi	125 mi	875 mi
Miles designated trails in lynx habitat that are not groomed	2,275 mi	1,050 mi	0	175 mi
Percent designated in lynx habitat that's not groomed	55%	39%	0%	16%

the areas where special use permits or authorizations could expand, into *areas of consistent snow compaction* that are not currently designated or groomed. These are places consistently used and compacted although use has not been encouraged. They are shown as open for winter recreation on travel maps. These areas would be identified on a baseline map of areas or routes consistently used in 1998, 1999 and 2000.

In effect, Alternatives C, D and E would allow grooming to expand

- On designated ungroomed routes;
- When grooming consolidates use or improves lynx habitat; or
- Into areas of consistent snow compaction established in the baseline.

See Figure 3-6 on page 209.

Alternatives C, D and E would allow designated ungroomed routes to expand

- When designation consolidates use or improves lynx habitat; or
- Into areas of consistent snow compaction.

Alternative E does not prohibit expansion of grooming beyond these areas; however, such expansion is discouraged by guideline HU G11.

These alternatives could result in an increase in designated over-the-snow routes, but should not result in more compacted snow since expansion would be into areas already compacted as established in the baseline. The newly designated routes could be groomed. Outside lynx habitat, the amendment would not limit anything.

Effects on routes & areas open, but not designated or groomed in lynx habitat
Alternatives B, C, D and E apply only to designated over-the-snow routes. They do not restrict areas shown as open for winter use on travel maps where use is not encouraged. This amendment also would not affect existing local decisions about which areas are available for winter use as shown on travel maps. The amendment affects only decisions about designated routes inside lynx habitat.

Ski areas

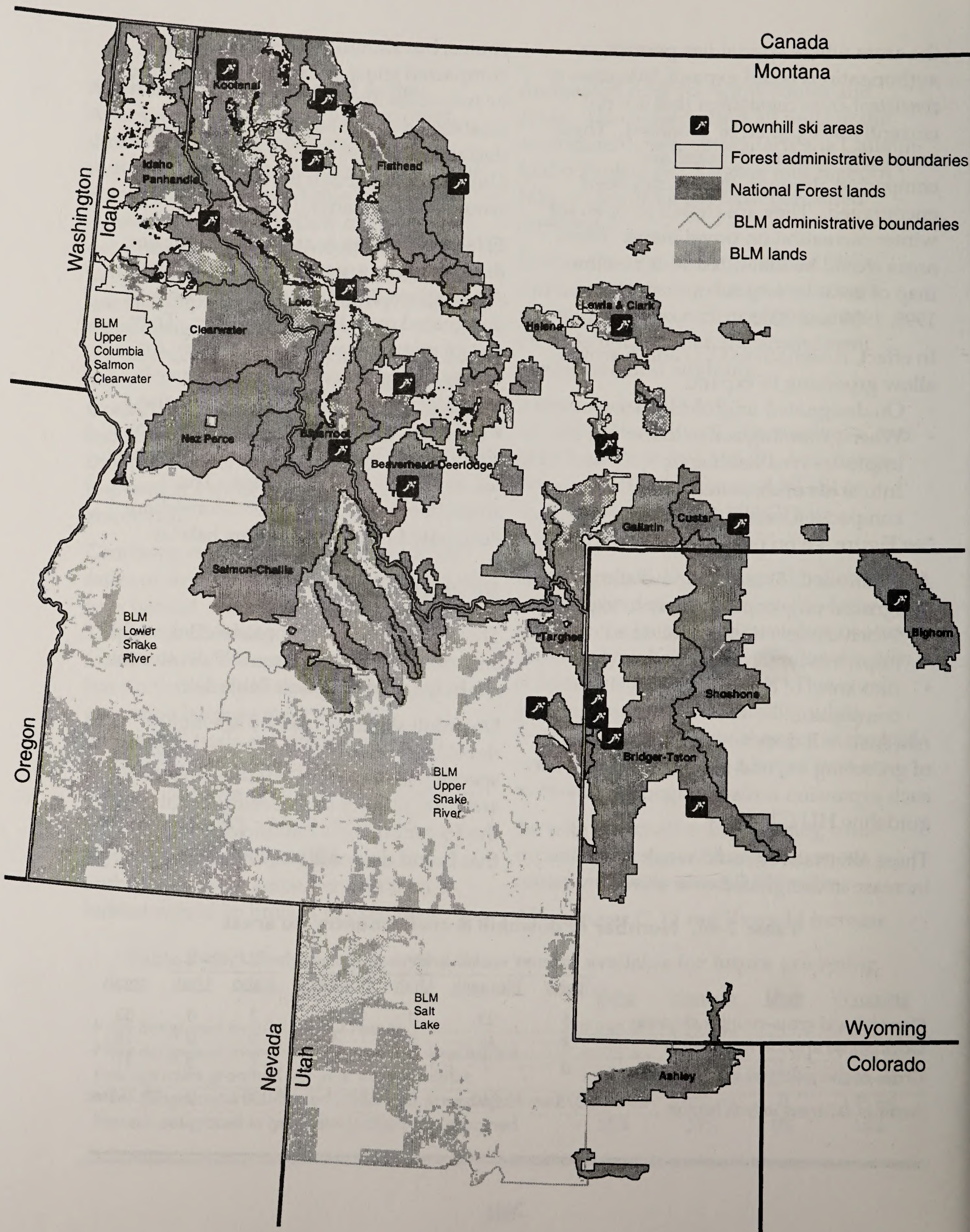
The amendment area contains 53 downhill and cross-country ski areas. Twenty-nine are in lynx habitat – see Table 3-46.

Downhill ski areas usually are highly developed recreation areas authorized by special use permits. Cross-country ski areas are usually less developed. In 1997, the FS conducted a nation-wide survey that found downhill ski visits increased by

Table 3-46. Number of downhill & cross-country ski areas

	NF lands				BLM lands		
	Idaho	Montana	Utah	Wyoming	Idaho	Utah	totals
Downhill and cross-country ski areas	6	23	0	21	3	0	53
Downhill ski areas in lynx habitat	3	11	0	4	0	0	18
Cross-country ski areas in lynx habitat	0	7	0	3	1	0	11
Acres of ski areas in lynx habitat	2,375 ac	13,860 ac	0	5,020 ac	8,000 ac	0	29,255 ac

Figure 3-7. Ski areas in the amendment area



58 percent, an increase even more dramatic than snowmobiling (USDA 1997).

Snowboarding, the improvements in skis and success in the 2002 winter Olympics, have all contributed to the expanding popularity of skiing. Increased use results in increased demand for more and larger ski areas.

The Flathead, Bridger-Teton and Bighorn NFs have the most permitted ski areas in lynx habitat in the amendment area – see Figure 3-7. The Flathead, Bridger-Teton, Gallatin and Targhee NFs have the most skiers – significantly more than the other units – ranging from 175,000 to 433,000 visits per year. Table K-10 in Appendix K contains information by unit.

Effects on ski areas

Alternative A, no action
Under the no-action alternative, developed ski areas would be managed under the existing plans.

Alternatives, B, C, D & E
There are no substantial differences in the effects on ski areas among Alternative B, C, D and E.

The amendment would have no effect on existing ski areas. The amendment would be applied only to the 12 ski areas planning expansions and the one new ski area planned. See Table 3-47.

The action alternatives all include the same objectives for managing developed areas in lynx habitat, Objectives HU O1, HU O2, HU O3 and HU O4 – see Table 2-1 in Chapter 2. These objectives describe desired landscape conditions, such as making sure future developments provide lynx landscape connectivity.

Alternative B includes Standard HU S2, mandatory for ski areas, that says where needed, trails, access roads and lift termini must be located to maintain and provide lynx diurnal security habitat. This standard is dropped in Alternatives C, D and E, and the management direction added in Guideline HU G10. A guideline is usually followed, but may be deviated from if there is rationale. If diurnal security habitat is identified as a need, this direction could affect what areas are available for ski runs and increase costs.

The action alternatives all include Guidelines HU G1, HU G2 and HU G3 that could affect the timing of operations and where ski runs would be located.

The management direction in this amendment would not preclude further development, but would require that lynx habitat needs be considered in expansions or new ski areas.

Table 3-47. Planned expansions or new ski areas during the next ten years

	NF lands				BLM lands		
	Idaho	Montana	Utah	Wyoming	Idaho	Utah	totals
Ski areas planning expansion in lynx habitat	3	8	0	1	0	0	12
New ski areas planned in lynx habitat	0	1	0	0	0	0	1

Cumulative effects

Alternative A, no action
It's likely the demand for both developed and dispersed winter recreation will increase during the next decade. The past, present and reasonably foreseeable future actions identified in Appendix L may limit where winter recreation activities may occur and expand.

There is some potential to expand use and maintain visitor satisfaction. Solutions to resolve conflicts between motorized and non-motorized users could include expanding use to places currently free from human-caused snow compaction, if allowed in existing plans.

Alternatives B, C, D & E
Given the expected increase in demand for winter recreation, cumulatively the amendment, in addition to the past, present and reasonably foreseeable future actions identified in Appendix L, may affect the area available for snow-compacting winter recreation. This could result in changes in user experience.

The amendment would not change existing opportunities; however it's likely an increased number of people will be using existing areas. People would likely encounter more traffic, especially on groomed trails.

Grooming could increase on most units under Alternative B, and on all units under Alternatives C, D and E. Designated ungroomed routes could not expand under Alternative B, but could expand into areas of consistent snow compaction under Alternatives C, D and E. Therefore, Alternatives C, D and E are likely to have less effect on user experience because more opportunities to meet increased demand are available.

Transportation

Highways

Affected environment

Highways typically follow natural features like lakes, rivers and valleys. They can directly affect the amount of winter snowshoe hare and denning habitat available by converting forests into road surfaces, rights-of-way, and the associated maintenance facilities and gravel pits (Ruediger et al. 2000, p. 2-17).

Highways can alter landscapes by fragmenting large tracts of land. As the standard of road increases from gravel to two-lane highway, traffic volume increases. According to the LCAS, lynx may become intimidated by traffic and may not cross highways when the volume reaches from 2,000 to 4,000 vehicles per day, particularly if traffic continues during the night. Parts of the following highways traverse lynx linkage areas – see Table 3-48. All the highways in the linkage areas, including most major highways in Idaho, western Montana, western Wyoming and northern Utah, were considered. Linkage areas were identified at interagency meetings held in amendment area states in 2001 and 2002.

See Appendix B.

The degree of impact increases as highways are upgraded from two lanes to four. Four-lane highways commonly have fences on each side, service roads, paralleling railroads and other impediments like 'Jersey barriers' that make crossing even more difficult. While the FS and BLM don't have authority over these highways, if right-of-way is involved, they can influence the consideration of wildlife crossings. Table 3-49 on the next page shows highways that have been upgraded from two lanes to four during the last decade and those planned during the next decade.

Beginning in 2004, a major improvement is planned on a 56-mile stretch of US Highway 93 in Montana from Evaro to Polson. Thirteen miles from Ronan to Polson will be widened to four lanes. A third lane will be added to parts of the remaining 43 miles – the Evaro portion is part of a lynx linkage area.

The reconstruction includes wildlife crossings and fencing to help wildlife move across the highway. The wildlife

Table 3-48. Highways in lynx linkage areas

	Interstate highways	US highways	State highways
Idaho	I-15 & I-90	US 2, 12, 26, 30, 93 & 95	ID 75
Montana	I-15 & I-90	US 2, 12, 89, 93, 187, 191,212, 287 & 310	MT 37, 43, 56, 72, 83 & 200
Utah	I-80	US 40	n/a
Wyoming	n/a	US 14, 16, 20, 26, 28, 30, 189, 191 & 212	WY 28

measures will increase the cost of the project five to eight percent.

Idaho, Montana, Utah and Wyoming all are evaluating ways to provide wildlife crossings and implementing their findings in their highway reconstruction plans (Stockstead, Soper, Stark & Just, pers. com.).

Effects

Table 3-49 shows the highways planned to be widened in lynx linkage areas over the next ten years.

Alternative A, no action

Under the no-action alternative, no changes would be made to plans that would require agencies to consider lynx habitat connectivity. Methods to provide safe wildlife crossings are being researched by all the state highway organizations in the amendment area, and are being incorporated into highway improvements.

Alternatives B, C, D and E

The management direction applying to highways deals with linkage areas and wildlife crossings, and includes Objectives ALL O1 and HU O6, Standard LINK S1 and Guideline ALL G1 – see Table 2-1 in Chapter 2.

Linkage areas for lynx already have been identified – see Figure 1-1. State and federal highway officials are using this data to identify potential wildlife crossings.

Other management direction would place more emphasis on wildlife crossings and may result in higher construction costs, but should facilitate wildlife movement and reduce accidents, injury and wildlife mortality.

Highway programs in the amendment area already have incorporated some wildlife crossings into their designs, so this standard may not cause any change beyond what's already being done.

Table 3-49. Highways upgrading from two to four lanes

Highway #	Reconstructed during last 10 years	To be reconstructed in next 10 years	In lynx linkage area?
Idaho			
US 95	MP* 508.1 to MP 510.6, near Bonners Ferry	n/a	no
US 95	n/a	MP* 522.2 to MP 527.25	no
US 95	n/a	MP 537.85 to MP 538.6, the Canadian border	yes
Montana			
US 2	Kalispell, 4.73 miles	n/a	no
US 93	Florence to Lolo, 23.4 miles	n/a	no
US 93	Somers intersection of Hiway 82 N, 4 miles	n/a	no
US 93	n/a	Ronan to Polson, 13 miles	yes
US 93	n/a	Hamilton to Florence, 11.6 miles	no
Wyoming			
US 30	n/a	Junction I-80 to Idaho state line, 100+ miles	yes

MP = mile point
(Ebret, Smith, Rains, Watson & Milburn, pers. com.)

Forest roads

Besides the legal direction described in Chapter 1, the following direction applies to forest roads.

36 CFR 212 – Administration of the forest transportation system
Adopted in January 2001 after the LCAS was finalized, this new policy directs the agency to maintain a safe, environmentally sound road network that responds to public needs and is affordable to manage. The policy includes a science-based process called *Roads Analysis*, designed to help managers make better decisions about roads.

Public Forest Service Roads
In December 2000, the FS proposed designating most of its arterial and collector roads as *public roads*, which would be open and available to the public on a regular and consistent basis, as defined in 23 U.S.C. 101 (USDA FS 2000b).

Affected environment

The amendment area contains more than 15,000 miles of open roads in lynx habitat. Roads can directly affect the amount of denning and foraging habitat available by removing forest cover.

According to the LCAS, lynx may use little-traveled roadways for travel and foraging in good snowshoe hare habitat. However, they seem to prefer to move through continuous forests, and frequently use ridges, saddles, and riparian areas.

Lynx may tolerate some level of human disturbance. Road density doesn't appear to affect lynx habitat selection (Ruediger et al. 2000, p. 12).

While displacement by humans does not appear to be a major factor, access via roads may increase the mortality risk to lynx from incidental trapping or illegal shooting, and by allowing competing carnivores, such as coyotes and mountain lions, access into lynx habitat in winter on compacted roads or trails.

In the amendment area, 8,690 miles of open forest road in lynx habitat are maintained for high-clearance vehicles (Maintenance level 2) and another 7,000 miles of open road are maintained for low-clearance vehicles (Maintenance levels 3 to 5) – see Table 3-50. The majority is on NF lands.

Table 3-50. Miles of forest road in lynx habitat in the amendment area

Maintenance level 2 (suitable only for high-clearance vehicles)	8,690 miles
Maintenance levels 3-5 (suitable for low-clearance vehicles)	7,000 miles
Paved to two or more lanes, last *decade*	15 miles
New & open, last *five years*	15 miles
‡Paved for resource reasons, last *five years*	2 miles

‡One-lane roads with low traffic

Present FS policy is to reduce the amount of open roads in maintenance levels 2 through 5, and to improve roads left open to reduce effects. The BLM has not developed road systems like the FS has, they are not actively reducing their road network.

New forest road construction has been drastically reduced during the last decade (USDA FS 2000b). Most road building is for timber harvest – very little is left open after logging is done. Some new road has been built to access campgrounds. Only 15 miles of road built in lynx habitat during the past five years are open to public use.

Many FS roads have heavy public use, and meet the use-and-needs criteria for county or state jurisdictions. In lynx habitat, about 15 miles of heavily used roads have been paved to two lanes during the last decade – see Table 3-50 on the previous page. The jurisdiction of these roads is usually turned over to state or county public road agencies to maintain after they are built.

Some low-traffic, one-lane roads are paved to reduced the sediment delivered to streams. In these cases, the traffic level is not considered to justify paving, and the roads are not considered public roads. See Tables K-12 and K-13 in Appendix K for a breakdown by unit.

Effects

Alternative A, no action

The theme for the FS is *fewer and better roads*. The trend is to continue to minimize development, to classify existing roads as either needed or unneeded, and to decommission unneeded roads. Many remaining roads remain targeted for improvement to make them comply with standards for safety and environmental protection.

For the BLM, the trend for forest roads is to continue to minimize development. The BLM does not have plans to decommission roads, because it has far fewer roads than the FS. Roads found to be surplus to their needs are decommissioned.

A Roads Analysis would be done before any work was done on FS roads. The analysis would identify resource concerns so projects would address them.

Table 3-51 shows the actions planned for FS and BLM forest roads in lynx habitat if budgets permit.

Table 3-51. Future forest roads in lynx habitat in the amendment area

Planned to be paved to two or more lanes, next *decade*	45 miles
Planned on ridge-top & open, next *decade*	5 miles
Planned new & open, next *five years*	10 miles
Planned to be upgraded, next *five years*	235 miles
‡Planned to be paved for resource reasons, next *five years*	2 miles

‡One-lane roads with low traffic

Future activities are estimates rounded to the nearest five miles & are subject to change.

During the next *decade*,

- About 45 miles may be widened to two lanes and paved to improve safety, air quality and to result the sediment delivered to streams.
- Five miles may be built on ridge-tops and left open. Ridge-tops are a much-preferred road location. Roads built on ridge-tops generally have less drainage problems with fewer culverts and ditches to maintain. The area exposed by cut and fill slopes is minimized, leaving less area open to slides.

During the next *five* years,

- About ten miles may be built and left open, mostly to serve recreational needs.
- About 235 miles may be improved, to reduce dust and stream siltation, straighten curves, widen roadways, add turnouts, improve drainage facilities and eliminate safety hazards. This work would improve traffic flow, increase design speed, increase safety and accommodate expected traffic increases.
- Two miles may be paved to reduce the sediment delivered to streams.

Alternative B, the Proposed Action

Alternative B proposes only guidelines for forest roads – see Table 2-1 in Chapter 2. Guidelines are preferred or advisable courses of action. Guidelines may be deviated from if reasons can be documented. See Tables K-12 and K-13 in Appendix K for a breakdown by unit.

Guideline ALL G1 would apply to the forest highways planned for paving during the next decade. Most of these miles would not have enough traffic to make this a concern. But where traffic is heavy, Guideline ALL G1 would heighten awareness about wildlife crossings and lead to investigating fencing and underpasses or overpasses to reduce the risk of mortality. This would add to the cost of construction.

Guideline HU G6 would discourage upgrades to unpaved roads. Disallowing upgrades may compromise safety, reduce air quality and increase the sediment delivered to streams. As the population grows and more people look to the outdoors for recreation, traffic may well increase even if roads aren't improved, which could increase the potential for accidents.

Two miles of paving for resource reasons are planned during the next five years. One mile may be paved to reduce the sediment delivered by a road located beside a stream in bull trout habitat – bull trout is a threatened species.

Guideline HU G6 also may affect the 235 miles of upgrades planned during the next five years. Changes are planned in road alignment and surfacing that would decrease the sediment delivered to streams, dust and traffic flow, increase design speed and safety, and accommodate more traffic. These improvements would have to be justified for the work to go forward. Most, if not all, of these roads lack the traffic volume

that would make them a concern or threat to lynx as described in the LCAS.

Guideline HU G7 could affect the ten miles of new permanent road construction planned for the next five years. If these roads were located near forested stringers – which may be important for lynx habitat connectivity – leaving them open in such locations would have to be justified.

Guideline HU G7 also discourages building new roads on ridge-tops and leaving them open. In the next decade, five such miles of road are planned. The alternate location for these roads is on side-slopes averaging 40 percent. Roads built on ridge-tops generally have less drainage problems with fewer culverts and ditches to maintain. The area exposed by cut and fill slopes is minimized, leaving less area open to slides.

Guideline HU G8 would minimize roadside brush cutting, which could increase accidents and animal mortality by reducing the sight distance and the time animals are visible to motorists. However, brush cutting can also result in more big game browsing on the brush next to roads.

Guideline HU G9 would restrict public use on new roads. Only ten miles of new road construction is planned to be left open during the next five years. Leaving these miles open would have to be justified.

Alternatives C, D & E

For forest roads and highways, Alternatives C, D and E would have similar effects to Alternative B, except that *Guideline HU G6* has been modified to encourage mitigation measures when the roads are upgraded. Guideline HU G6 would encourage the use of wildlife crossings and fencing to reduce or avoid the mortality caused by collisions.

Cumulative effects

Highways
Alternative A
The past, present and reasonably foreseeable actions listed in Appendix L have had a limited effect on highways except to incorporate management direction related to stream and river crossings.

Alternatives B, C, D and E
The amendment would add more management direction for considering highway crossings for wildlife, which would cumulatively increase costs.

Roads
Alternative A
The past, present and reasonably foreseeable actions listed in Appendix L have cumulatively changed the emphasis of road management, away from constructing roads, and towards keeping and improving needed roads and decommissioning unneeded roads.

Alternatives B, C, D and E
Cumulatively, the amendment in addition to the past, present and reasonably foreseeable future actions identified in Appendix L, would limit new roads open to the public in lynx habitat. The amendment would require further analysis and consideration for upgrading roads, especially those that increase traffic volumes or speeds, which could result in increased costs.

Minerals

A wide variety of mineral and energy resources occur on amendment area lands. The authority of the FS and BLM to manage mineral activities depends on the commodity and the legal status of the lands on which they occur. More information can be found in the Project Record.

Definitions

Surface-disturbing activities associated with mineral and energy resources typically include:

Prospecting
Prospecting is identifying an area with potential for mineral development. It involves limited surface disturbance, such as geologic mapping or soil or water sampling. Prospecting for oil and gas often involves collecting seismic data.

Exploration
Exploration is physically searching for minerals. It often includes building roads, drill pads, underground workings and trenching.

Development
Development is the work required to prepare a mineral deposit for production. It may include driving underground workings, stripping the overburden from deposits that will be open-pit or strip mined, building waste dumps and constructing milling and transporting facilities.

Oil and gas development includes drilling a series of production wells and building access roads.

Production
Production is removing a mineral from the ground and making it available for final processing and consumption.

Reclamation
Reclamation is restoring the areas disturbed during exploration, development and production.

Management constraints

The *status* of the land affects the legal authorities that apply to management and disposal of minerals. Land is in one of the following *status* categories:

- Lands reserved from the public domain
- Acquired lands
- Lands with outstanding or reserved rights
- Private land with federally owned minerals

Mineral resources may be classified into three categories:

- Mineral materials
- Locatable minerals
- Leasable minerals

The combination of land status and the type of mineral resource define the agency's management authority.

Mineral materials

Affected environment

Mineral materials are common minerals such as stone, gravel, clay, cinders and decorative rock, whose disposal is authorized under the Materials Act of 1947. This act provides for disposing of mineral materials on public lands through bidding, negotiated contracts or free use. The FS and BLM have full authority to make decisions about disposing of mineral materials on lands of all status categories.

The FS and BLM use mineral materials from their lands for building and surfacing system roads. The FS and BLM may sell these mineral materials, or issue free-use permits to state and county governments for public projects such as highway construction and maintenance. All contracts contain requirements for reclaiming sites to pre-mining conditions as much as possible.

There are about 2,600 active mineral-material pits on NF lands in the amendment area. In fiscal year 2000, about 800,000 tons of mineral materials worth more than $2.8 million were removed from these lands. About a quarter was removed by the FS for its own use. Demand for mineral materials is expected to grow as demand increases for public and private infrastructure.

Excavation, temporary storage and transport are associated with removing mineral materials. Typically, sites are small, less than five acres. Most are near or next to roads and do not require significant amounts of new road. They seldom overlap the high-elevation, remote places where lynx habitat occurs.

Only two to three percent of mineral-materials sites permitted in the last 15 years were in lynx habitat. Presently, only one mineral-material site in lynx habitat has winter operations.

Effects

Alternative A, no action
Management direction about mineral materials would not be changed under the no-action alternative, so there would be no effect.

Alternatives B, C, D & E
Alternatives B, C and D add management direction including Objective HU O5, Standards ALL S1 and HU S3, and Guidelines HU G4, HU G5 and HU G9 – see Table 2-1 in Chapter 2. This direction is about road use and requires considering lynx habitat needs during mineral exploration and development. Standard HU S3 is changed to a less restrictive guideline, guideline HU G 12 in Alternative E.

The effects of the action alternatives on expanding the development of existing sites would be minimal, because most are accessed by existing roads and are not in lynx habitat. Effects on new developments in lynx habitat would be minimal because the developments are generally small and the road use requirements already exist.

Locatable minerals

Affected environment

Locatable minerals such as gold, silver, copper and other metals, are subject to the General Mining Law of 1872 as amended. This law grants a statutory right to explore for and develop these minerals, unless the land has been formally withdrawn from mineral entry.

The FS manages impacts to other resources related to the exploration, development and production of locatable minerals on its lands via regulations at 36 CFR 228, Subpart A, and the BLM manages locatable minerals via regulations at 43 CFR 3809.

FS authority is directed at using the surface of NF lands (30 U.S.C. 21-54). The FS may not deny proposed operations or make them impossible by imposing unreasonably restrictive management requirements or conditions. However, the FS may require mitigation and list requirements to minimize adverse impacts.

Both BLM and FS regulations say mining operations should minimize adverse environmental impacts to surface resources. BLM regulations say to prevent "unnecessary and undue degradation" and to avoid adverse effects on threatened and endangered species. FS regulations include "taking all practicable measures" to maintain and protect wildlife habitat, and to reclaim surface disturbances including rehabilitating wildlife habitat.

FS regulations also require that roads be built and maintained to minimize or eliminate damage to other resources including wildlife. Unless otherwise authorized, roads that are no longer needed are to be closed, bridges and culverts removed, and the road surface shaped to a natural contour and stabilized.

Current situation

The amendment area has a long history of locatable hard-rock minerals activity, mostly exploring and mining for lode gold, silver, copper and other metals. Today, this usually takes place in historic mining areas, or where more recent interpretations of the geology lead to the discovery and production of economically valuable deposits.

Mining has waned since the late 1800's. Only a fraction of the historic sites operate today, and those that continue, do so with much more stringent environmental protection measures.

Most recent activity involves maintaining existing facilities – there are few new exploration and production sites. Typically, motorized vehicles use established routes for access. New access requires project-specific analysis and approval.

The majority of surface disturbances are less than 20 acres. Presently there are five larger locatable operations ranging from 100 to 600 acres on NF lands in lynx habitat in the amendment area, all in Montana. Only two are operating. The

other three are in the care-and-maintenance or reclamation phases.

Based on the minerals database maintained by FS Regions 1 and 4, which covers the last 15 years, about one-third of all Notices of Intent and Plans of Operation were for sites in lynx habitat. In fiscal year 2000, the FS processed 142 Plans of Operation and received 550 Notices of Intent.

Future locatable mineral activity is likely to occur in areas of existing operations and where the geology is favorable for economically viable mines. Significant future exploration or development is not expected; the potential for future mineral discovery is considered low.

Effects

Alternative A, no action
Management direction about locatable minerals would not be changed under the no-action alternative, so there would be no effect. Existing requirements for wildlife protection are provided in 36 CFR 228, Subpart A, which requires operators to comply with ESA. Impacts to and protection or mitigation measures for species are identified in project analysis before decisions are made about disturbance.

Alternatives B, C, D & E
Alternatives B, C and D add management direction including Objective HU O5, Standards ALL S1 and HU S3, and Guidelines HU G4, HU G5 and HU G9 – see Table 2-1 in Chapter 2. This direction requires considering lynx habitat needs during mineral exploration and development. Standard HU S3 is changed to a less restrictive guideline, Guideline HU G 12 in Alternative E.

The action alternatives do not preclude developing locatable minerals because the agencies do not have the authority to simply deny developing hard-rock mineral deposits. However they do require lynx habitat needs be considered and lynx habitat connectivity be provided. This could require additional mitigation and conditions to minimize effects on lynx, and could increase costs of development.

Leasable minerals

Affected environment

Leasable materials are federally owned fossil fuels (oil, gas, coal, oil shale, etc.), geothermal resources, sulfur, phosphates and uranium, that are subject to exploration and development under leases, permits or licenses issued by the Secretary of the Interior, with FS input on NF lands.

The 1920 Mineral Leasing Act, as amended, together with the 1989 Federal Onshore Oil and Gas Leasing Reform Act, provide the authority and management direction for federal leasable minerals on federal lands. In 1970, the Geothermal Steam Act added steam to the list of minerals that could be leased on NF lands.

Regulations at 36 CFR 228.108 require oil and gas operators to comply with ESA during operations. They require roads and surface disturbances to be reshaped and revegetated when closed or abandoned. Mining operators also are obliged to post reclamation bonds to make sure reclamation takes place. Most existing plans include standards and guidelines for reclaiming mining operations.

The National Energy Policy was issued May 18, 2002. It says:

> *"Agencies shall expedite their review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health and environmental protection."*

Acquired lands (hard-rock minerals)
Hard-rock minerals described as *locatable* on public-domain lands, are described as *leasable* on lands acquired by the FS or BLM after 1891. On lands where the agencies acquired mineral as well as surface rights, the BLM issues the prospecting permits and leases for hard-rock minerals – on NF acquired lands, BLM must first obtain the consent of the FS.

Oil, gas, coal or geothermal
The BLM issues oil and gas, coal and geothermal leases. The most common leases in this area are oil and gas leases which are issued for 10-year terms. Leasing decisions and development decisions are made in two stages:

- First, the FS makes a lease decision about which lands will be open for leasing, based on an analysis of the impacts of exploration and development. This decision identifies which areas will be open to development subject to standard lease terms, which areas will be open to development subject to constraints – called *lease stipulations* – and which will be closed to leasing. The FS informs the BLM of the results and the BLM is responsible for issuing the lease.
- Then, after a lease is issued, the lessee has legal rights to explore and develop, subject to the terms of the lease and other applicable state and federal laws. The lessee must obtain approval from the BLM and FS for post-lease

activities. This is when site-specific resource protection measures developed through NEPA are applied as conditions of approval for the surface-use plan of operations. Such measures must be within the scope of the rights granted under the terms of the lease.

Solid non-energy leasable materials
The BLM also issues 10-year-term leases for solid non-energy leasable materials, such as phosphate or sodium. The FS has no consent authority, but the BLM generally accepts FS recommendations.

Current situation

The oil and gas industry has been stable during the past decade, but is projected to grow. Currently in the amendment area, about 820,000 acres are under lease for oil and gas, with more acres pending.

Transmission pipelines are an integral part of the infrastructure associated with oil and gas production. Presently, there are no pipelines in lynx habitat.

During the last decade, only two wells have been drilled in lynx habitat in the amendment area. One, on the Custer NF in Montana, was plugged and abandoned. The other, on the Bridger-Teton NF in Wyoming, is in production.

Eight forests and three BLM units in the amendment area made lease-availability decisions for oil and gas. Recent estimates of foreseeable development suggest that eight more wells may be drilled in the next decade in lynx habitat – see Table K-11 in Appendix K.

All leases say that before any disturbance may occur, surveys or studies may be needed to determine the extent of impacts on resources and whether mitigation will be required.

Leases also say that if threatened or endangered species are observed during operations, the lessee shall stop doing anything that would result in the destruction of the species.

There is one solid leasable mineral operation in the amendment area on the Clearwater NF; however it is located outside lynx habitat. The Idaho Panhandle NF has received requests for garnet leases and will evaluate them during the next few years.

Effects

Alternative A, no action
Management direction about leasable minerals would not be changed under the no-action alternative, so there would be no effect. Existing requirements for wildlife protection are provided in 36 CFR 228.108(f), which requires operators to comply with ESA. Impacts to and protection or mitigation measures for species are identified in project analysis before decisions are made about disturbances.

Alternatives B, C, D & E
Alternatives B, C and D add management direction including Objective HU O5, Standards ALL S1 and HU S3, and Guidelines HU G4, HU G5 and HU G9 – see Table 2-1 in Chapter 2. This direction requires considering lynx habitat needs during exploration and development. Standard HU S3 is changed to a less restrictive guideline, Guideline HU G12 in Alternative E.

Oil and gas well development has the potential to impact lynx habitat. However, most drilling in the amendment area is done at lower elevations outside lynx habitat. Implementing the action alternatives would have little effect on oil and gas operations because, in large part, the standards and guidelines address requirements already included in regulations or existing management direction.

While the lynx amendment may increase the cost of operations in lynx habitat, it would not prohibit access to federal minerals.

The action alternatives were analyzed to see if the amendment would require more lease stipulations, but none were found. When lease proposals are received, units would see if leasing is consistent with their leasing decisions and their existing plans. This amendment would add direction that would be considered as conditions of approval when permits were being processed.

- *Standard HU S3* would require designating winter access routes for geophysical exploration in lynx habitat. Standard HU S3 also would require designating access routes during any season if exploratory wells were proposed on a lease in lynx habitat. (In Alternative E, Guideline HU G12 encourages the same actions.)
- *Guideline HU G3* would encourage avoiding ridge-top and saddle locations for new roads, which could result in higher costs but would not delay or rule out exploration.

Operators may experience some restrictions if they want to access their site during winter – the ease of movement across frozen ground makes winter exploration attractive for oil and gas.

- *Guideline HU G4* encourages using remote monitoring.
- *Guideline HU G9* encourages restricting the public's use of roads.

Both could be conditions of approval for new drilling permits.

Once a site is developed, the activity slows down. Monitoring a producing site usually involves little traffic. Some sites can be monitored remotely, using satellite technology. Oil production sites that use a pump jack or where oil is stored on-site would require regular, frequent visits.

Producing natural gas with a lift system, where the gas is directed into a flow line through a separator or dehydration unit, would not require frequent visits. Gas flow and line pressure could be monitored remotely, using solar power. Working with oil and gas operators during planning to encourage remote monitoring in the winter, may minimize snow compaction in some areas.

Adding amendment direction to existing plans would be consistent with the National Energy Policy because the direction should result in expediting permit review. The analysis shows that more stipulations are not needed to conserve lynx. The amendment direction can be applied as conditions of approval during the permit-to-drill stage – see item 18 of the *Management direction considered, not in detail* in Chapter 2.

Lands with outstanding or reserved rights

Affected environment

Private parties own some of the minerals on NF lands. Most of the NF lands in the northern Rockies were reserved from the public domain under the Forest Reserve Act of 1891. Since then, other lands have been acquired.

The titles to some of these lands are encumbered with *reservations* – sometimes the previous owner *reserved* the mineral rights. In other cases, mineral rights were separated from the surface estate before the federal government acquired the surface – these mineral rights are *outstanding* to third parties. A very small percentage of lands in the amendment area have reserved or outstanding rights.

These reserved and outstanding rights represent property interests in the land. Although the federal government owns and administers the surface, the mineral owner has certain rights as well. The most important of these is the right to access and develop the minerals. Other rights may be spelled out in individual deeds. The FS must consider these property interests during planning and implementation.

Effects

Alternative A, no action
Management direction about lands with outstanding or reserved rights would not be changed under the no-action alternative, so there would be no effect.

Alternatives B, C, D & E
Alternatives B, C, and D add Objective HU O5, Standards ALL S1 and HU S3 and Guidelines HU G4, HU G5 and HU G9 – see Table 2-1 in Chapter 2. This direction requires considering lynx habitat needs during mineral exploration and development, subject to valid existing rights. Standard HU S3 is changed to a less restrictive guideline, Guideline HU G12 in Alternative E.

The effect of the action alternatives on reserved and outstanding mineral resources is directly related to the mitigation measures designed to protect habitat for lynx.

The FS is limited in its authority to deny developing outstanding and reserved rights. Resource protection measures must be reasonable and cannot foreclose exploration or development. The management direction adopted in this amendment is not expected to significantly affect reserved or outstanding rights.

Most exploration would not experience any restrictions, because drilling and trenching are generally not done during winter when snow compaction could present a problem. If new mine development is proposed inside lynx habitat, it's possible different road locations or more mitigation would be required. This could result in higher project costs, but would not delay or rule out prospecting, exploration or development.

Cumulative effects

Alternative A
The past, present and reasonably foreseeable actions listed in Appendix L have cumulatively had a limited effect on mineral resources. Costs have likely increased due to the environmental protections required under INFISH and PACFISH. The Roadless Policy, if it were in effect, could result in changes to the areas available for mineral and energy development.

Alternatives B, C, D & E
Cumulatively the amendment, in addition to the past, present and reasonably foreseeable future actions identified in Appendix L, would add more environmental protections, potentially further increasing costs. Several of the proposed requirements are already considered in project development, so the increases are unlikely to be substantial.

Land ownership

Affected environment

The continuity of land ownership in the amendment area varies inside FS and BLM boundaries, and includes parcels of lands owned by private entities, states and other federal agencies.

In the northern Rockies, NF and BLM lands are generally fairly well connected, providing a good opportunity to maintain lynx habitat connectivity. The national forests in western Wyoming are adjacent to Yellowstone National Park, which is continuous public land not subject to development or exchange, adding to the ability to maintain lynx habitat connectivity. The amendment area includes scattered, isolated federal parcels that do not contribute to connectivity. Private lands not managed for lynx usually surround these isolated tracts.

For the FS and BLM, land ownership changes come about through land exchanges, direct purchase and conservation easements that enhance and protect wildlife habitat. The federal real estate program is active throughout the amendment area. Its purpose is to manage and conserve the public's real property for the purposes for which it was reserved from the public domain. One of its primary goals is to consolidate land ownership patterns to help more effectively and efficiently manage federal lands.

The LCAS says "... connectivity with habitats and source populations in Canada is critical to the conservation of populations in the U.S." At this time there are no natural or human-caused barriers that effectively prohibit movement of lynx between Canada and the northern Rockies (USDI FWS, 2003).

Effects

Alternative A, no action
The real estate program would not change. Land ownership adjustments would continue, but may not be a priority because of limited funding. In some areas, lynx habitat may be exchanged, and in others it may be acquired. During the next decade, the federal government plans to acquire about 375,000 acres of land. There are no cumulative effects *per se* to landownership adjustments.

Alternative B, the Proposed Action and the other action alternatives, C, D and E
The Proposed Action, Alternative B, and the other action alternatives, C, D and E, all include Guideline LINK G1, which encourages retaining federal lands in public ownership.

An active real estate program could enhance and protect lynx habitat connectivity by retaining public lands and acquiring non-federal lands. During the next decade, about 375,000 acres could be acquired through land exchanges or purchases – some of this will be lynx habitat. This estimate may change depending on landowners' willingness to exchange or sell their land. More lynx habitat could be enhanced and protected by acquiring conservation easements.

The continued federal ownership of scattered, isolated NF and BLM lands that do not promote connectivity for lynx would be assessed on the project level.

Special use permits

Affected environment

Forest Service direction
For the FS, *special uses* are defined in 36 CFR 251.50(a) as:

> *All uses of NFS lands, improvement and resources, except those provided for in the regulation governing the disposal of timber (Part 223) and minerals (Part 228) and the grazing of livestock (Part 222), are designated as "Special Uses."*

A special use authorization can be a permit, a term permit, a lease or an easement. There are more than 100 different kinds of special uses that can be authorized on NF lands.

BLM direction
Permission to use lands administered by the BLM for similar purposes is authorized by Title V of FLPMA, and implementation procedures are defined in 43 CFR Part 2800 – Rights of Way. Under BLM procedures, the permitted uses granted under rights-of-way are not called special uses, but the effect of the authorization is the same as on NF lands.

BLM's land special uses include but are not limited to electronic transmission and distribution lines, telephone lines, fiber optic cables, railroads, reservoirs, ditches, roads, highways, communication sites, oil and gas pipelines, hydropower projects, seismic sites for research and military exercises. Authorizations also can be issued for such things as fences.

Special use proposals are evaluated against several criteria, including

- Can the use occur on other lands
- Is the use is in the public interest
- Does the applicant have the financial and technical ability to construct and maintain the facility

Criteria for screening proposals on NF lands are found at 36 CFR 251; BLM criteria are found at 43 CFR 2802 – Applications.

A large number of requests are received each year for road access in the amendment area because private lands are often next to or inside NF or BLM boundaries. Many tracts are small and zoned by counties to allow development.

Some private tracts are *inholdings*, privately owned lands surrounded by federal lands. Inholdings are guaranteed access under ANILCA (Alaska National Interests Lands Conservation Act of 1980), which says landowners shall be authorized access "adequate to secure them the reasonable use and enjoyment of their land" (36 CFR 251.110(c)).

Effects

Alternative A
Management direction would not be changed under the no-action alternative, so there would be no effect.

Currently each special use authorization contains terms and conditions to minimize damage to wildlife habitat and protect the environment (36 CFR 251.56 (a)(i)(B) & 43 CFR 2802.4). Impacts to and protection or mitigation measures for threatened and endangered species are identified in project analysis before any decisions are made about whether disturbances will be allowed.

No cumulative effects have been noted.

Alternatives B, C, D & E
The action alternatives would add management direction including Objectives HU O3 and HU O5 and Standards ALL S1 and HU S3 – see Table 2-1 in Chapter 2. This direction requires considering lynx habitat needs in special use authorizations.

The action alternatives do not preclude special uses; however, they do require lynx habitat needs to be considered and connectivity provided.

More conditions of approval and mitigation measures to reduce effects on lynx could be required and could increase costs of development. The standards could limit the options for where access roads and authorized facilities would be located.

No cumulative effects have been noted.

Economics & social

Social and economic analyses are conducted to determine what affect land management decisions may have on local communities, economies and the people who use natural resources. This analysis considers the potential effects of the alternatives on employment, income and other financial aspects, as well as on lifestyles and other factors.

Affected environment

Population

The 2000 U.S. Census showed a population increase in the four states in the amendment area (US Census Bureau 2000). The populations of Utah and Idaho are both more than one million. Table 3-52 shows the population for these states in the last two censuses, the change from 1990 to 2000, as well as projections for the year 2015.

The 2000 census resulted in reported population densities of 15.6 people per square mile in Idaho, 6 in Montana, 27.2 in Utah and 5.1 in Wyoming. Populations are expected to continue to grow. By 2015, the population of Idaho is expected to increase 25 percent, Montana by 18 percent, Utah 20 percent and Wyoming 30 percent.

Population changes are measured by counting natural increase – births minus deaths – and migration.

The states have fairly homogenous populations. Table 3-53 on the following page shows the racial composition by state.

A number of communities in the amendment area depend heavily on natural resources from public lands, including:

Idaho

Ashton, Bonners Ferry, Clark Fork, Driggs, Dubois, Idaho Falls, Kamiah, Kooskia, Moyie Springs, Orofino, Pierce, Rexburg, Ririe, Salmon, St. Anthony, Sandpoint, Victor and Weippe;

Montana

Alberton, Columbia Falls, Darby, Deer Lodge, Drummond, Eureka, Gardiner, Libby, Lincoln, Philipsburg, Red Lodge,

Table 3-52. Past and projected population of the analysis area

	1990 Population	2000 Population	2005 Population	2015 Population	2025 Population	Change 1990 to 2000 Number	Change 1990 to 2000 Percent
Idaho	1,006,749	1,293,953	1,480,000	1,622,000	1,739,000	287,204	28.5%
Montana	799,013	902,195	1,006,000	1,069,000	1,121,000	103,182	12.9%
Utah	1,722,850	2,233,169	2,411,000	2,670,000	2,883,000	510,319	29.6%
Wyoming	453,588	493,782	568,000	641,000	694,000	40,194	8.9%
U.S.	248,709,873	281,421,906	285,980,000	310,133,000	335,048,000	32,712,033	13.2%

Source: U.S. Bureau of the Census

Rexford, Seeley Lake, Superior, Thompson Falls, Troy and West Yellowstone;

Utah
Kamas and Vernal; and

Wyoming
Buffalo, Evanston, Green River, Greybull, Jackson, Kemmerer, Lovell, Rock Springs and Worland.

Demographic trends
Several demographic trends will impact the amendment area in the next few decades. The first and most notable is that during the next 25 years, the West is expected to grow at nearly twice the national average rate.

The second trend, common to all states, is the aging of the population (Campbell 1996). The percent of people under 20 years of age will decrease, and the percent over 65 will increase during the next 30 years. After the year 2010, the elderly proportion will increase rapidly as the "baby boomers" born between 1946 and 1964 finally begin to reach retirement age. Utah, Idaho and Wyoming are projected to be among the states with the most rapid growth in this segment, with national rankings anticipated to be second, third and sixth respectively.

The third trend is the increasing level of participation in outdoor recreation, and the tendency for each succeeding generation during the last century to increase its level of participation (USDA 1997). It's expected that the "baby boomers" will continue this trend, having been exposed to a broader range of outdoor activities then were their parents.

Economic

The four states in the amendment area constitute a very large land area containing many "economies" as defined by Bureau of Economic Analysis classification system (USDC 1995). The information describing the economic environment is presented at the state level.

Employment
Figure 3-8 displays employment growth for full- and part-time workers (for both proprietors, and wage and salary) of major industries by state over the last 31 years (USDC 2002).

Table 3-53. Year 2000 population race by state

	Population	White	American Indian/ Alaska Native	Asian	Black/ African American	Other*
Idaho	1,293,953	91%	1%	1%	<1%	7%
Montana	902,195	90%	6%	<1%	<1%	2%
Utah	2,233,169	89%	1%	2%	1%	7%
Wyoming	493,782	92%	2%	<1%	1%	4%

*Native Hawaiian and other Pacific Islanders, some other race, or two or more races.
Source: U.S. Census Bureau, Census 2000

Idaho

In 1969 in Idaho, the largest major industry employer was government, with about 59,500 jobs statewide. By 1999, four industries accounted for more than half the employment – services, retail trade, government and manufacturing. Services were the largest at about 199,260 jobs and mining the smallest, with only 3,261 jobs. In 1999, employment not including farming totaled about 761,000 jobs statewide.

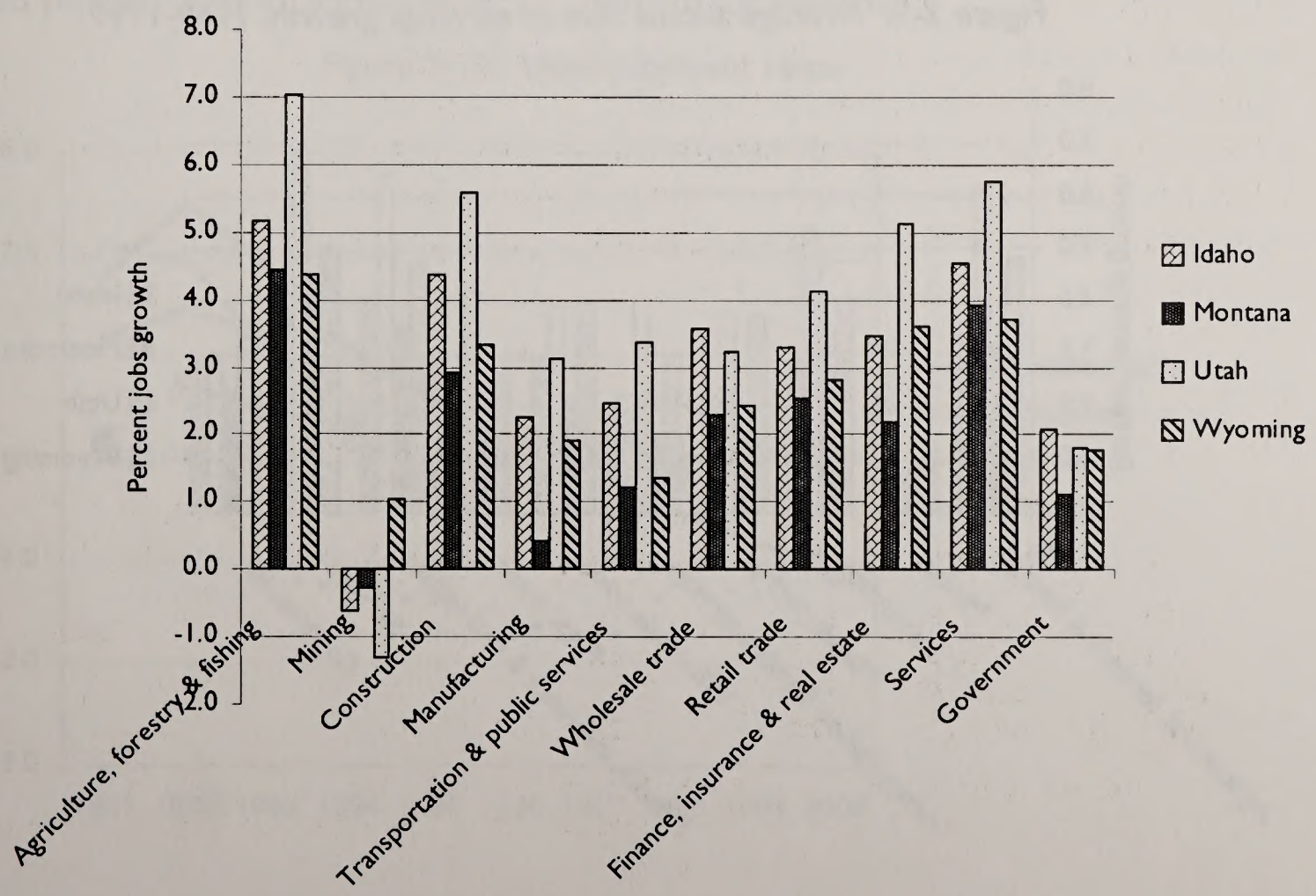
From 1969 to 1999, all sectors (except mining) experienced positive average annual employment growth, ranging from -0.6 percent for mining, to 5.2 percent for agriculture, forestry and fishing.

Montana

In 1969 in Montana, the largest major industry employer was government, with about 60,000 jobs statewide. By 1999, three industries accounted for more than half the employment – services, retail trade and government. Services were the largest at about 168,000 jobs and mining the smallest, with only about 6,500 jobs. In 1999, employment not including farming totaled about 520,000 jobs statewide.

From 1969 to 1999, all sectors (except mining) experienced positive average annual employment growth, ranging from -0.3 percent for mining, to 4.5 percent for agriculture, forestry and fishing.

Figure 3-8. Average annual rate of job growth, 1969-1999



Utah
In 1969 in Utah, the largest major industry employer was government, with about 114,000 jobs statewide. By 1999, four industries accounted for more than half the employment – services, retail trade, government and manufacturing. Services were the largest at about 406,200 jobs and mining the smallest, with only about 8,800 jobs. In 1999, employment not including farming totaled about 1,335,000 jobs statewide.

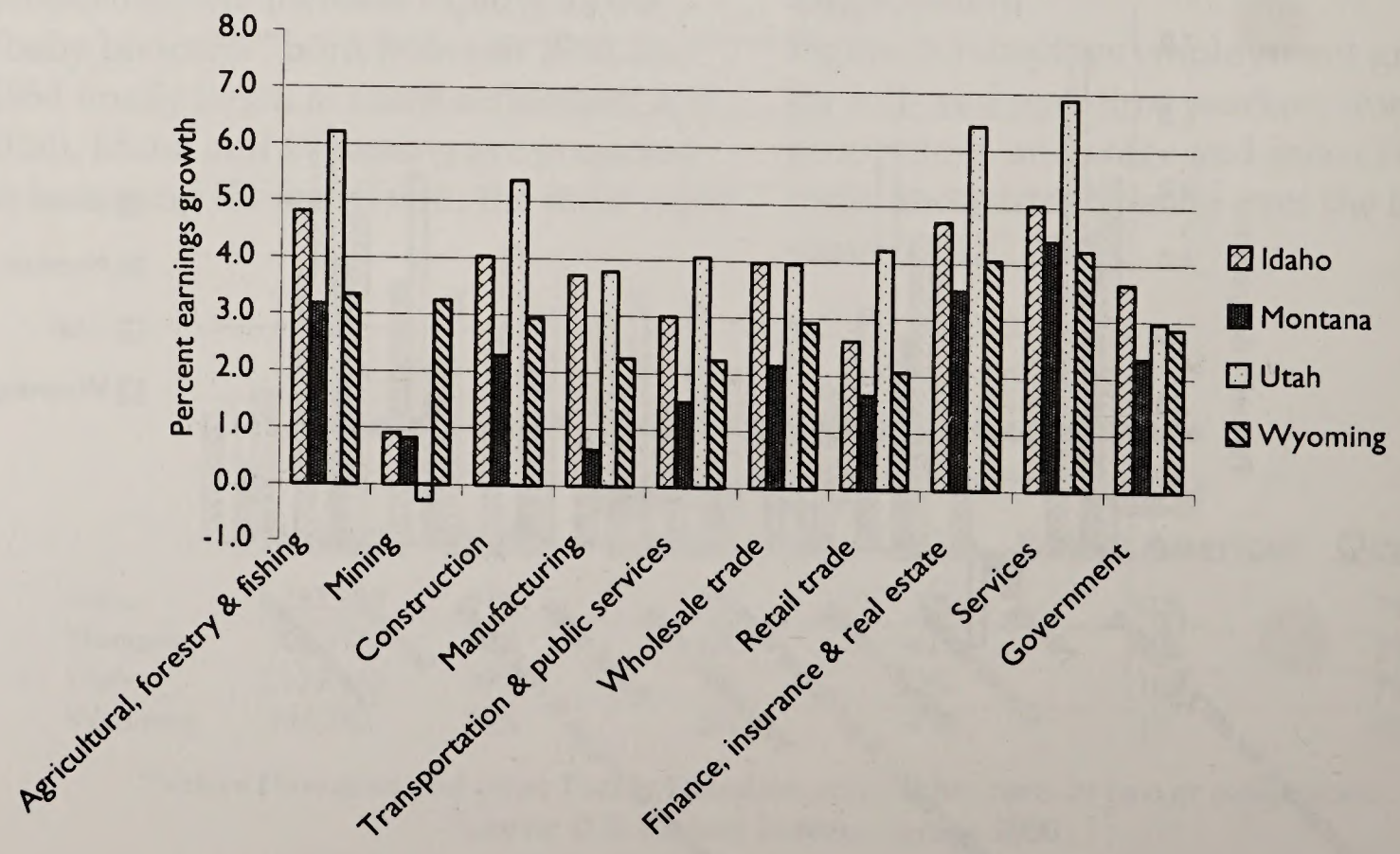
From 1969 to 1999, all sectors (except mining) experienced positive average annual employment growth, ranging from -1.3 percent for mining, to 7.0 percent for agriculture, forestry and fishing.

Wyoming
In 1969 in Wyoming, the largest major industry employer was government, with about 36,700 jobs, and total private employment at about 143,600 jobs. By 1999, three industries accounted for more than half the employment – services, government and retail trade. Services were the largest at about 82,300 jobs and agriculture, forestry and fishing the smallest, with only about 4,700 jobs. In 1999, employment not including farming totaled about 309,400 jobs statewide.

From 1969 to 1999, all sectors experienced positive average annual employment growth, ranging from 1.0 percent for mining, to 4.4 percent for agriculture, forestry and fishing.

Earnings
Figure 3-9 shows the average annual earnings growth between 1969 and 1999 by major industry by state (USDC 2002). All earnings data have been inflation

Figure 3-9. Average annual rate of earnings growth, 1969-1999



adjusted to year 2000 dollars. Earnings (wages and salaries, other labor income and proprietors' income) are useful in analyzing regional economies, since they are a proxy for income generated from participation in current production.

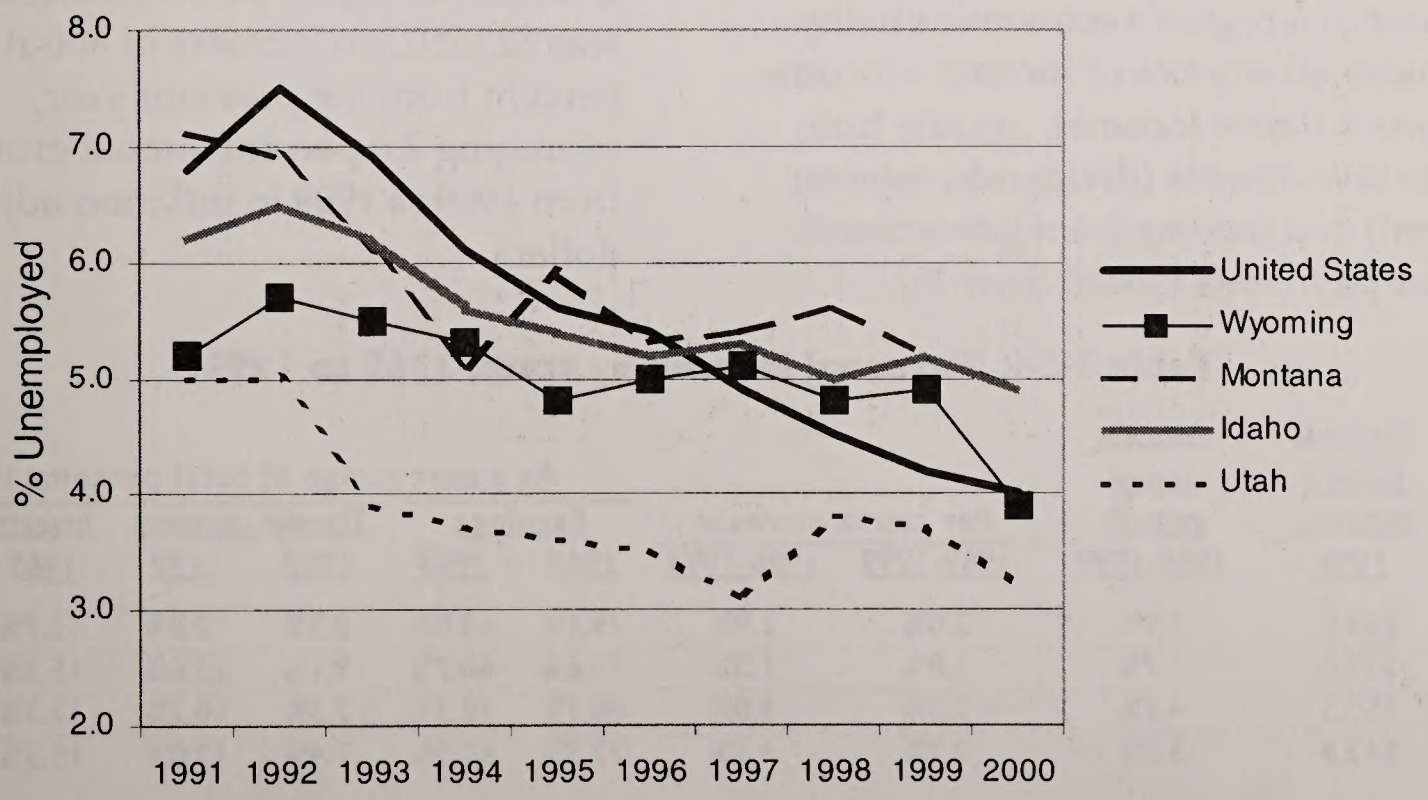
Idaho
All the major industries in Idaho experienced positive earnings growth in real dollars from 1969 to 1999. The average annual earnings growth ranged from 5.0 percent for services, to 4.8 percent for agriculture, forestry and fishing, to 0.9 percent for mining. Even though mining saw a decline in employment, the jobs remaining experienced some earnings growth in inflation-adjusted terms. Services grew the fastest and mining grew the slowest.

Montana
All the major industries in Montana experienced positive earnings growth in real dollars from 1969 to 1999. Again, though mining saw a decline in employment, the jobs remaining experienced some earnings growth in inflation-adjusted terms. Finance and services grew the fastest, and manufacturing and mining grew the slowest.

Utah
All the major industries in Utah experienced positive earnings growth in real dollars from 1969 to 1999, except for mining. The average annual earnings growth ranged from -0.3 percent for mining to 6.9 percent for services.

Wyoming
All the major industries in Wyoming experienced positive earnings growth in real dollars from 1969 to 1999. The average annual earnings growth ranged from 2.1 percent for retail trade to 4.2 percent for services.

Figure 3-10. Unemployment rates



Unemployment

Figure 3-10 displays the unemployment rates for the states within the amendment area compared to the country as a whole (USDL 2002). The unemployment rate is the percentage of the labor force that's not working, but is actively seeking work. The unemployment rate for each state quantifies the magnitude of joblessness. The U.S. rate is included as a point of reference to better understand how unemployment in the amendment area compares to the situation at the national level.

In general, the trend for unemployment during the 1990's was one of decline. The chart shows unemployment rates for each state as a whole – state-level data can mask the variability found at the county level. In the amendment area, counties with the highest unemployment rates tend to be rural.

Personal income

Personal income is generally seen as a key indicator of a region's economic vitality. It includes all sources of income – income from work (labor income), income from private investments (dividends, interest and rent) and income from government transfer payments (Social Security, retirement, disability, Medicare and Medicaid).

Table 3-54 shows the total personal income for 1999, and its average annual growth from 1969 to 1999 by state (USDC 2002). To further measure the economic vitality of an area, divide personal income by the population, yielding per-capita personal income. Per-capita personal income was inflation adjusted to year 2000 dollars.

Table 3-54 also shows how the components of personal income have changed over the last thirty years.

- The earnings share has declined, indicating labor income has become a smaller component of personal income.
- The transfer payments share has increased, indicating payments from the government have increased substantially.

Idaho

- In 1999, per capita personal income was $23,292, an increase of about 2.9 percent from the previous year, averaging 2.0 percent annual growth from 1969 to 1999 in inflation-adjusted dollars.

Table 3-54. Personal income by state, 1969 to 1999

	Personal Income (billions) 1999	Average annual growth 1969-1999	Per capita increase		As a percentage of total personal income					
					Earnings		Transfer payments		Investment income	
			1969-1999	1998-1999	1969	1999	1969	1999	1969	1999
Idaho	$29.2	3.9%	2.0%	2.9%	79.1%	68.0%	8.3%	12.8%	12.7%	19.2%
Montana	$19.8	2.7%	1.8%	1.8%	75.6%	60.7%	9.1%	15.6%	15.3%	23.8%
Utah	$50.5	4.7%	2.2%	3.0%	80.1%	72.3%	7.5%	10.2%	12.3%	17.5%
Wyoming	$12.9	3.5%	2.2%	4.3%	77.3%	61.9%	7.4%	12.0%	15.3%	26.1%

Montana

- In 1999, per capita personal income was $22,400, an increase of about 1.8 percent from the previous year, averaging 1.8 percent annual growth from 1969 to 1999 in inflation-adjusted dollars.
- Dividends, interest and rent also have increased.

Utah

In 1999, per capita personal income was $23,705, an increase of about 3.0 percent from the previous year, averaging 2.2 percent annual growth from 1969 to 1999 in inflation-adjusted dollars.

Wyoming

In 1999, per capita personal income was $26,849, an increase of about 4.3 percent from the previous year, averaging 2.2 percent annual growth from 1969 to 1999 in inflation-adjusted dollars.

Effects

Each alternative was evaluated to determine what affect it would have on employment and labor income in the four states in the amendment area.

Economic effects

The largest effect to the amendment area's economy comes from the proposed restrictions on precommercial thinning in Standard VEG S5, found in all the action alternatives.

Economic effects of precommercial thinning

During the last five years, contractors have performed about 80 percent of the precommercial thinning work done by the FS and BLM. There's not a specific economic industry sector defined for precommercial thinning – instead, its economic activity is recorded as part of the agriculture, forestry and fishing sector. Unfortunately, we cannot identify how much precommercial thinning contributes to this sector.

In 1999, the agriculture, forestry and fishing sector amounted to the following percentage of total state employment in the amendment area:

- Idaho, 2.4 percent
- Montana, 1.6 percent
- Utah, only 0.8 percent
- Wyoming, 1.5 percent

Analysis procedures

Economic effects can be categorized as direct, indirect and induced. Direct effects are changes associated with the initial effects of a program. Indirect and induced effects are ripple effects resulting from subsequent rounds of spending in the economy.

An input-output analysis was used to estimate the job and labor income effects stemming from precommercial thinning. The analysis traced the links between economic sectors and calculates the economic effects resulting from a direct impact on the economy.

Input-output analysis requires identifying an economic impact area. Functional economic areas provided by the Bureau of Economic Analysis guided development of the 18 economic areas used in this analysis. More information can be found about impact areas in the economics report in the Project Record.

The IMPLAN Pro analysis system and 1999 IMPLAN data were used to develop the input-output models for this analysis (IMPLAN Professional 1999). For each of the impact areas, estimates were made of the jobs and labor income stemming from the precommercial thinning operations defined in the alternatives.

Funding precommercial thinning

To develop precommercial thinning costs, first each of the FS and BLM field offices developed precommercial thinning plans for the next decade for each alternative. Next they provided their thinning costs per acre. Then the total thinning costs were calculated for each alternative.

Two scenarios were developed, one based on full funding and the other based on an average of past funding. The full-funding

scenario assumes Congress would allocate enough money to do all the precommercial thinning planned.

The average-funding scenario assumes an amount based on past funding. Historically the precommercial thinning program has not been fully funded – funding has varied from year to year. From 1994 to 1998 (the five years before lynx became an issue), amendment-area forests received funding to do an average of 34 percent of the precommercial thinning planned, about 20,000 acres a year. This is the basis for the average-funding scenario.

It could be assumed that funding for about 20,000 acres a year would continue. But experience has shown funding is allocated in direct proportion to what's requested, so it is more likely that a percent of what's requested would be funded. If precommercial thinning requests were severely curtailed by Standard VEG S5, there could be an even more significant drop in the dollars allocated to do the work.

Historically, the BLM units have received enough money to fully fund their programs. Their programs have been very limited.

The effects are presented first for the average-funding scenario of about 20,000 acres, then for the full-funding scenario.

In both cases, Alternative A, no action, provides a baseline for comparison, because it shows the amount of precommercial thinning that could be done if no restrictions were applied to conserve lynx habitat.

Average funding

Table 3-55 shows the acres that would be precommercially thinned during the next decade by alternative and state, assuming the average-funding scenario of about 20,000 acres a year.

Table 3-56 on the following page displays the employment and labor income effects of the alternatives over a decade by state, assuming average funding.

The economic effects shown here are total effects – direct, indirect and induced. The economic effects consist of jobs and income tied directly to thinning, plus ripple effects from industries supporting

Table 3-55. Precommercial thinning* by alternative after a decade of average funding

	Alternative A	Alternative B	Alternatives C & E	Alternative D
Idaho	76,410 acres	23,360 acres	23,370 acres	50,420 acres
Montana	100,910 acres	33,000 acres	33,510 acres	77,120 acres
Utah	3,180 acres	410 acres	410 acres	700 acres
Wyoming	13,030 acres	5,180 acres	5,180 acres	10,180 acres
BLM (Idaho only)‡	4,740 acres	3,930 acres	3,930 acres	3,930 acres
Totals	198,270 acres	65,880 acres	66,400 acres	142,350 acres

*Acres shown are both in and out of lynx habitat – reductions are all taken inside lynx habitat

‡ No precommercial thinning is planned on BLM lands in Utah

Table 3-56. Economic effects by alternative after a decade of average funding

	Alternative A		Alternative B		Alternatives C & E		Alternative D	
	Jobs	Income M$	Jobs	Income M$	Jobs	Income M$	Jobs	Income M$
Idaho	849	$10,905	281	$3,666	281	$3,668	476	$6,298
Montana	861	$7,916	287	$2,631	291	$2,674	556	$5,090
Utah	10	$129	1	$17	1	$17	2	$28
Wyoming	110	$1,229	44	$508	44	$508	89	$997
Totals	1,830	$20,179	613	$6,822	617	$6,866	1,123	$12,413

thinning. Table 3-57 compares the economic effects of the alternatives, assuming average funding for decade.

It's important to note again that it's impossible to predict what the actual funding would be. The differences between the alternatives would not be as great if we could be sure that 20,000 acres would be funded.

Full funding

Table 3-58 on the following page shows the acres that would be precommercially thinned during the next decade by alternative and state, if Congress appropriated enough money to do all the thinning planned. This would be a substantial increase compared to the existing situation because the precommercial thinning program has never been fully funded.

Table 3-59 on the following page displays the employment and labor income effects of the alternatives over a decade by state, assuming full funding.

Again, the economic effects here are totals – direct, indirect and induced – comprising jobs and income tired directly to thinning, plus ripple effects from supporting industries. Table 3-60 compares economic effects after a decade of full funding.

Table 3-57. Comparison of economic effects after a decade of average funding

	Number of jobs			Labor income M$		
	B vs A	C&E vs A	D vs A	B vs A	C&E vs A	D vs A
Idaho	-568	-568	-373	-$7,239	-$7,237	-$4,607
Montana	-574	-570	-305	-$5,285	-$5,242	-$2,826
Utah	-9	-9	-8	-$112	-$112	-$101
Wyoming	-66	-66	-21	-$721	-$721	-$232
Totals	-1,217	-1,213	-707	-$13,357	-$13,313	-$7,766

Table 3-58. Precommercial thinning* by alternative after a decade of full funding

	Alternative A	Alternative B	Alternatives C & E	Alternative D
Idaho	226,980 acres	70,280 acres	70,320 acres	153,930 acres
Montana	315,310 acres	103,070 acres	104,700 acres	240,970 acres
Utah	8,580 acres	1,100 acres	1,100 acres	1,880 acres
Wyoming	25,350 acres	8,630 acres	8,630 acres	20,590 acres
BLM (Idaho)‡	4,740 acres	3,930 acres	3,930 acres	3,930 acres
Totals	580,960 acres	187,010 acres	188,680 acres	421,300 acres

*Acres shown are both in and out of lynx habitat – reductions are all taken inside lynx habitat
‡ No precommercial thinning is planned on BLM lands in Utah

Table 3-59. Economic effects by alternative after a decade of full funding

	Alternative A		Alternative B		Alternatives C & E		Alternative D	
	Jobs	Income M$	Jobs	Income M$	Jobs	Income M$	Jobs	Income M$
Idaho	2,423	$31,286	758	$9,978	758	$9,984	1,361	$18,089
Montana	2,692	$24,737	894	$8,223	910	$8,353	1,738	$15,829
Utah	27	$349	3	$45	3	$45	6	$76
Wyoming	219	$2,459	73	$847	73	$847	184	$2,072
Totals	5,361	$58,831	1,728	$19,092	1,744	$19,228	3,289	$36,065

Table 3-60. Comparison of economic effects after a decade of full funding

	Number of jobs			Labor income M$		
	B vs A	C&E vs A	D vs A	B vs A	C&E vs A	D vs A
Idaho	-1,665	-1,665	-1,062	-$21,309	-$21,303	-$13,198
Montana	-1,798	-1,782	-954	-$16,515	-$16,384	-$8,909
Utah	-24	-24	-21	-$304	-$304	-$272
Wyoming	-146	-146	-35	-$1,612	-$1,612	-$387
Totals	-3,633	-3,617	-2,072	-$39,739	-$39,603	-$22,766

Alternative A, no action
Table 3-55 shows that under the no-action alternative, if for the next decade the precommercial thinning program was funded at about 20,000 acres a year (the average-funding scenario), about 200,000 acres would be thinned, representing about 180 jobs per year and about $20 million in labor income.

Table 3-58 shows that under the no-action alternative, if for the next decade the precommercial thinning program was fully funded, about 580,000 acres would be thinned, representing about 540 jobs per year and about $60 million in labor income. This would be a considerable increase above the existing situation, because the precommercial thinning program has never been fully funded.

Under either funding scenario, most of the jobs and labor income effects would occur in Montana and Idaho, where most of the precommercial thinning is planned.

Alternative B, C & E
These three alternatives have similar effects, so they are discussed together. Alternative B would defer precommercial thinning until stands no longer provide snowshoe hare habitat. Alternatives C and E are identical in terms of precommercial thinning – both would defer precommercial thinning until stands no longer provide snowshoe hare habitat, with some minor exceptions.

Table 3-55 shows that under Alternatives B, C or E, if for the next decade the precommercial thinning program was funded at about 20,000 acres a year (the average-funding scenario), about 130,000 of the 200,000 acres planned would not be thinned because they are in lynx habitat. These alternatives each would represent about 61 jobs per year and about $700,000 in labor income under the average-funding scenario.

Compared to the no-action alternative under the average-funding scenario, Alternatives B, C or E would represent a loss of about two-thirds of the jobs and labor income. The effect would be felt most in those rural communities named in the Affected Environment portion of this report, communities that tend to experience a higher unemployment rate. The communities most affected are in the seven NF's experiencing 80 percent of the reduction, the Idaho Panhandle, Salmon-Challis and Targhee NF's in Idaho, and the Beaverhead-Deerlodge, Flathead, Kootenai and Lolo NF's in Montana. See Tables K-14 and K-17 in Appendix K for a breakdown by unit.

Alternative D
Alternative D would defer precommercial thinning under certain circumstances and conditions.

Table 3-55 shows that under Alternative D, if for the next decade the precommercial thinning program was funded at about 20,000 acres a year (the average-funding scenario), about 55,000 of the 200,000 acres planned would not be thinned because they are in lynx habitat. Alternative D would represent about 110 jobs per year and about $1.3 million in labor income under the average-funding scenario.

Compared to the no-action alternative under the average-funding scenario, Alternative D would represent a loss of

about one-third of the jobs and labor income. This would be only about half the reductions expected under Alternatives B, C and E. The communities most affected would be the same as under Alternatives B, D and E.

Economic effects of snowmobling

Table 3-61 shows the trend in the number of registered snowmobiles in amendment area states. This information is useful in gauging the popularity of snowmobiling, an outdoor activity for which precise estimates of use over time are difficult to obtain. The data indicates an upward trend in all states.

Idaho

The Department of Resource Recreation and Tourism at the University of Idaho conducted a study of winter sports in Idaho during the winter season of 1994-1995 (Parrish, Leidner, Hunt & Sanyal 1994). This study was not designed to collect economic information, so estimates of economic effects are not available for snowmobiling in Idaho.

Montana

The Bureau of Business and Economic Research (BBER) at the University of Montana studied the economic contributions of snowmobiling in Montana in 1988, 1994 and 1998. According to the 1998 BBER report, during the winter 1997-1998, between 9 and 14 percent of Montana residents participated in snowmobiling – this amounts to 1.1 million activity days for Montana resident snowmobilers. BBER estimated more than 222,000 non-resident activity days.

The Montana resident and non-resident days combined amounted to 1.3 million snowmobile activity days, greater than the total at downhill ski areas, which amounted to about 1 million days.

Table 3-62 on the next page shows the spending profiles for snowmobilers in Montana during the winter of 1997-1998. Resident snowmobilers spent about $54 per person per activity day and non-residents spent about $200.

Resident snowmobilers spent about $60 million during the same period for daily personal expenses. Residents spent the most on gasoline, amounting to $22.8 million or 38 percent. Residents spent the next most on eating and drinking, amounting to just under $12 million or about 20 percent.

Table 3-61. Growth in number of snowmobiles registered by state

	Registered snowmobiles		Average growth	
	1989 – 1991	2000 – 2001	Registered snowmobiles	State population
Idaho	22,300 in 1989	47,500 in 2000	7.1%	2.5%
Montana	15,100 in 1991	24,600 in 2001	5.0%	1.2%
Utah	12,800 in 1990	29,400 in 2001	7.9%	2.6%
Wyoming	15,300 in 1989	18,200 in 2000	1.6%	0.8%

Data from Idaho Department of Motorized Vehicles; Montana Department of Fish, Wildlife & Parks; Utah State Parks & Recreation Department; and Wyoming State Parks & Trails Department

Table 3-62. Spending in Montana by resident and non-resident snowmobilers in 1997-1998

Item	Per person per day			
	Resident		Non-resident	
Gas for snowmobiles	$10.15	18.6%	$12.76	6.4%
Gas for transportation	$10.55	19.4%	$14.39	7.3%
Lodging	$8.55	15.7%	$70.28	35.5%
Eating & drinking	$10.87	19.9%	$49.02	24.7%
Grocery & convenience stores	$5.63	10.3%	$9.48	4.8%
Entertainment & recreation places	$1.06	1.9%	$9.51	4.8%
Snowmobile dealers	$6.13	11.3%	$18.02	9.1%
Other retail	$1.46	2.7%	$12.11	6.1%
Other	$0.11	0.2%	$2.51	1.3%
Daily totals	$54.51	100%	$198.08	100%

Non-resident snowmobilers spent more than $44 million during the winter of 1997-1998 for daily personal expenses in Montana. About $16 million, or 36 percent, was spent on lodging, and $11 million, or 25 percent, in restaurants and drinking establishments.

Utah

The Institute of Outdoor Recreation and Tourism at Utah State University studied the economic impact of resident snowmobilers in Utah during the winter of 1999-2000 (McCoy, Fujisaki, Blahna & Keith 2001). Table 3-63 shows residents spent about $19.7 million on trip-related expenses, with an average of about $127 per trip.

Most money was spent repairing or maintaining snowmobiles. The second and third most was spent on gasoline for the snowmobiles and towing vehicles. Since only residents were surveyed,

Table 3-63. Spending in Utah by resident snowmobilers in 1999-2000

Item	Per trip	
Gas for snowmobiles	$31.03	24.5%
Gas for transportation	$22.40	17.6%
Lodging	$6.39	5.0%
Eating & drinking	$8.50	6.7%
Grocery & convenience stores	$13.28	10.5%
Parking area fees	$1.07	0.8%
Other recreation activities	$0.79	0.6%
Snowmobile rental, tour packages, or guide services	$0.75	0.6%
Repair or maintenance of snowmobiles	$36.86	29.1%
Retail items	$5.67	4.5%
Other	$0.13	0.1%
Total per trip	$126.87	100%

Table 3-64. Spending in Wyoming by non-resident snowmobilers in 2000-2001

	Per person per day	
Lodging	$35.17	35.5%
Eating & drinking	$21.90	22.2%
Grocery/liquor	$6.17	6.2%
Gasoline	$17.73	17.9%
Oil/repair	$3.28	3.3%
Retail	$6.02	6.1%
Snowmobile rental	$3.06	3.1%
Guided tours	$2.80	2.8%
Other recreation	$0.94	1.0%
Other purchases	$1.92	1.9%
Totals	$98.99	100%

spending on food and lodging was relatively low.

Direct employment and labor income derived from the $19.7 million was estimated to be 171 jobs and $3.3 million in labor income in Utah. The total economic effect – direct plus indirect – was estimated at 259 jobs, representing $5.5 million in labor income.

Wyoming

The Department of Agricultural and Applied Economics at the University of Wyoming published a report in October 2001 reporting findings of an economic assessment of snowmobiling in Wyoming (McManus, Coupal & Taylor 2001). The study included residents, non-residents and the clients of outfitters. Economic impacts were developed only for non-residents and outfitter clients, since they bring new dollars into the state's economy.

Residents spent $69 per person per day. Total resident spending was about $94.4

Table 3-65. Spending in Wyoming by snowmobile outfitter clients in 2000-2001

	Per person per day	
Lodging	$32.58	18.1%
Eating & drinking	$19.91	11.0%
Grocery/liquor	$3.73	2.1%
Gasoline	$6.78	3.8%
Oil/repair	$1.19	0.7%
Retail items	$13.78	7.7%
Snowmobile rental	$18.24	10.1%
Snowmobile tours	$20.93	11.6%
Guided tours	$52.12	28.8%
Other recreation	$6.89	3.8%
Other purchases	$4.11	2.3%
Totals	$180.27	100%

million, which accounted for $4.5 million in state and local government revenue.

Non-residents spent $98.99 per person per day in Wyoming. Total non-resident spending was about $97.6 million. Table 3-64 on the previous page shows the economic impact of non-resident spending was estimated to be 2,482 jobs, representing $34.4 million in labor income.

Outfitter clients spent $180.27 per person per day, or about $40.8 million. Table 3-65 on the previous page shows the economic impact from outfitter clients alone amounted to 1,335 jobs and $15.9 million in labor income.

Alternative A, no action
An increasing trend in snowmobile use is likely. Since Alternative A would impose no change to winter recreation opportunities, it would have no effect on the economic contributions of snowmobiles.

Alternative B, the Proposed Action
Alternative B would allow no net increase in designated over-the-snow routes. Grooming could expand on routes currently designated. New or expanded special use authorizations or agreements would be limited to existing designated routes and areas. Some outfitters could be affected on a local basis.

However, there would be no restrictions preventing the public from expanding use anyplace identified on a travel plan map as open to motorized use. Therefore, there would be no effect on the economy.

Alternative B would not change the contributions of snowmobiling to the economy, and the current level of use is likely to continue.

Alternatives C, D & E
Alternatives C, D and E would allow no net increase in designated over-the-snow routes, except where existing use already is concentrated. Grooming could expand on routes currently designated. Alternatives C, D and E would allow some expansion, so they are unlikely to result in localized effects on outfitters.

Like Alternative B, Alternatives C, D and E would place no restrictions preventing the public from expanding use, so there would be no effect on the economy.

Alternatives C, D and E would not change the current economic contributions of snowmobiling and is unlikely to change growth trends, since some expansion of routes is anticipated.

Economic effects of downhill and cross-country skiing

Information about the economic contribution of ski areas and cross-country skiing could not be established, so an economic analysis was not done. NEPA says that when information is incomplete and unavailable, "... the agency shall always make clear that such information is lacking" (40 CFR 1502.22). The available information was presented in the *Recreation* section.

Nevertheless, all the action alternatives would have negligible effects on skiing. The action alternatives could increase some costs associated with developing or expanding ski areas, but would not result in preventing new or expanding existing areas. It's unlikely the increased costs

would be a significant adverse effect on ski area development or expansion.

Economic effects from other standards & guidelines

Alternative A, no action
Under the no-action alternative all sectors except mining would likely continue their present positive average annual employment growth rates.

Alternative A would have no effect on or change the economic contributions of outfitters, livestock grazing or mineral resource management. Therefore, it would not have an economic effect on these industries.

Effects common to Alternatives B, C, D & E
Action Alternatives B, C, D and E would have a negligible economic effect on grazing, ski areas and mining. The standards do not rule out developing new or managing existing grazing allotments, ski areas or mineral resources. However, managing to provide for lynx habitat needs could result in increased costs. For example:

- Grazing allotment costs may increase because Standard GRAZ S3 requires what may be new direction in some cases for managing livestock in riparian areas;
- Costs for new or expanding ski areas may increase because under Alternative B's Standard HU S2 requires and under Alternatives C, D and E's Guideline HU G10 suggests that when new trails, access roads and lift termini are planned, they should be located to provide lynx diurnal security habitat; and
- Costs for oil and gas leasing may increase because Guideline HU G4 recommends monitoring wells remotely. However, remote monitoring may be cheaper in the long term.

Social effects

Social impacts are described in terms of social well-being. Factors that can affect social well-being include the availability, amount and quality of resources such as recreation and economic opportunities.

Public concerns expressed in response to the proposed action ranged from strong opposition to strong support. Some people were concerned that the proposal would reduce motorized recreation opportunities and be unfair to the elderly, disabled and families with young children. Others were concerned it might close off family-oriented recreation opportunities such as cross country skiing and snowmobiling or result in losing access to public lands.

Social effects of precommercial thinning

Alternative A, no action
Alternative A, no action, would not change the current social environment or employment opportunities, so there would be no social effects.

Alternatives B, C, D & E
All the action alternatives would result in fewer employment opportunities in communities associated with the Idaho Panhandle, Salmon-Challis and Targhee NF's in Idaho, and the Beaverhead-Deerlodge, Flathead, Kootenai and Lolo NF's in Montana. Compared to no action,

Alternatives B, C and E would result in a reduction of about two-thirds of the jobs stemming from precommercial thinning under the average-funding scenario, and Alternative D would result in about one-third. If the selected alternative were funded close to the 20,000-acre historic average, then employment opportunities would be more similar to no-action.

Social effects of snowmobiling

Alternative A, no action
Alternative A would not change the current social environment or employment opportunities or what routes were available for over-the-snow activities or their potential to expand, so there would be no social effects.

Alternative B, the Proposed Action
Under Alternative B, use levels may increase on existing groomed routes, so user experience likely would change.

General use in places identified on travel plan maps as open for motorized use would not be affected by the alternative. But in some places, most probably the NF's immediately adjacent to Yellowstone National Park, it could affect future levels of general use, due to increased use on existing designated trails, and therefore change user experience. The average growth in snowmobile use could level out.

Alternatives C, D & E
Under Alternatives C, D and E, groomed routes could increase, so there should be no change in user experience. General use in places identified on travel plan maps as open for motorized use would not be affected, so there should be no change in user experience.

Social effects from other standards & guidelines

Action Alternatives B, C, D and E would have a negligible social effect on grazing, ski areas and mining. The standards do not rule out developing new or managing existing grazing allotments, ski areas or mineral resources. However, managing to provide for lynx habitat needs could result in increased costs. For example, the cost of a ski pass could increase and the amount of area available for ski area expansion or development could reduce. This could affect skier satisfaction in the long-term.

Cumulative effects

The cumulative effects analysis focused on the additive changes of past, present and reasonably foreseeable future programmatic actions. Appendix L identifies these actions and describes how they could contribute cumulatively to social and economic consequences.

Alternative A
Past, present and reasonably foreseeable programmatic decisions have been affecting local economies and social well-being, especially small rural communities with economies that depend heavily on natural resources from public lands.

Communities in the Idaho Panhandle, Salmon-Challis and Targhee NFs in Idaho, and the Beaverhead-Deerlodge, Flathead, Kootenai and Lolo NFs in Montana, have been most affected.

Alternatives B, C, D & E
The past, present and reasonably foreseeable programmatic decisions, in addition to the lynx amendment, may cumulatively affect local economies, especially small, rural communities with economies that depend heavily on natural resources from public lands.

Those communities are the places most likely to experience social and economic cumulative effects resulting from the reductions in precommercial thinning in Alternatives B, C and E. There would be less effect from Alternative D because there is less reduction in the precommercial thinning program.

Civil rights and environmental justice

No civil rights effects associated with age, race, creed, color, national origin or gender have been identified.

During the course of this analysis, potential impacts to minority populations were considered. Tribes with aboriginal territories in the analysis area were identified and contacted both formally and informally.

No alternative considered resulted in any identifiable effects or issues specific to any known minority or low-income population or community.

The agencies have considered input from all persons and groups, regardless of age, race, income status or other social and economic characteristics.

Other required disclosures

The alternatives are programmatic in nature, consisting of direction that would be applied to future management activities. They do not prescribe site-specific activities on the ground. Standards in the alternatives do not allow more actions that could affect the environment than existing plans do.

American Indian Religious Freedom Act and tribal treaty rights
No effects on American Indian social, economic, or subsistence rights are anticipated.

Prime farmland, rangeland or forestland
None of the alternatives would adversely affect prime farmland or rangeland. National Forest System lands are not considered prime forestland.

Effects on floodplains or wetlands
None of the alternatives would adversely affect floodplains or wetlands. Existing management direction for these resources would be maintained.

Effects on heritage resources
Heritage resources include areas, sites, buildings, art, architecture, memorials, and objects that have scientific, historic, or cultural value. They link people to their cultural history, provide insight into how people lived in the past, and reveal past and ongoing relationships between people and the natural world.

The NHPA (National Historic Preservation Act) and its implementing regulations require that federal agencies consider the effects of their undertakings on historic properties. The term historic properties refer to cultural properties that have been determined eligible for the NRHP (National Register of Historic Places).

Federal agencies must also consider American Indian traditional use, belief system, religious practices and lifeway values as directed by the Archeological Resource Protection Act of 1979, the NHPA, the Native American Graves Protection and Repatriation Act and the AIRFA (American Indian Religious Freedom Act). Traditional American Indian cultural properties and natural features are potentially eligible to the NRHP. Contemporary use sites for traditional or cultural purposes are provided protection under AIRFA.

The alternatives do not propose management direction that affects heritage resources. When site-specific projects are proposed, a cultural inventory of some degree would be conducted to prevent damage, mitigate unforeseen damage, or prevent impacts to sites in compliance with applicable requirements.

Effects on water quality
Section 303(d) of the Clean Water Act requires States to evaluate water quality in light of state water quality standards, report those stream segments that are impaired, and require development of

total maximum daily load of pollutants. The states in the amendment area have identified impaired stream segments on NF and BLM lands and they are working with the agencies to determine how to reduce pollutants impacts and meet total maximum daily load requirements.

The alternatives encourage the use of fire to restore ecosystems; however, they do not change management allocations to allow fires to burn in new areas. The alternatives could result in fewer ground disturbing activities such as less precommercial thinning, and could result in additional protection of riparian areas from grazing. Therefore, the alternatives would not indirectly result in further degradation of 303(d) listed waters.

Effects on special areas
Special areas include Wilderness areas, proposed wilderness, Wild and Scenic and River Corridors. These areas are generally to be managed to maintain their existing character. The alternatives do not change the overall management direction of these areas.

Effects on other resources
Several other resources are not affected by the programmatic management direction. These include but are not limited to caves, soils, and scenery.

Amendment found "non-significant" under NFMA

The purpose of this amendment is to incorporate management direction into plans for the conservation and recovery of the Canada lynx.

The NFMA significance determination is based on a review of the degree to which management direction for the area covered by a forest plan is being changed.

NFMA provides that forest plans may be amended in any manner, but if the amendment results in a significant change in the plan, additional procedures must be followed. Forest Service Handbook 1909.12, section 5.32, identifies four factors to consider in determining whether an amendment is significant. These factors are addressed below. Note, the BLM does not have a similar requirement under FLPMA; therefore this analysis only applies to land management plans prepared by the Forest Service.

The greatest change in existing plans would be caused by the selection of Alternatives B or C; therefore this analysis generally focuses on these alternatives. If an alternative with greater effects is selected, this analysis would be updated.

Factor 1: Timing
Identify when the change is to take place. Determine whether the change is necessary during or after the plan period or whether the change is to take place after the next scheduled revision of the forest plan.

NFMA requires that Forest and Grassland plans be revised every 15 years. All but one of the plans has been in place since 1986-1987. The plan revisions are scheduled in the next few years. The Targhee completed its plan revision in 2000. Thus for most plans it is late in the current planning period.

The amendment is taking place during the current planning period prior to completion of the revisions on all forests but the Targhee. As stated in FSH 1909.12, "the later the change, the less likely it is to be significant for the current forest plan." During revision, all units may revisit the management direction added by this amendment, and incorporate local information.

Factor 2: Location and size
Determine the location and size of the area involved. Define the relationship of the affected area to the overall planning area.

There are approximately 38.5 million acres within the 18 National Forests in the amendment area. Of this, approximately 18 million acres or 48 percent has been mapped as lynx habitat (see table 3.1). Most of the management direction proposed in the alternatives would modify the direction in land allocations that allow for development such as timber harvest. Of the 18 million acres of mapped lynx habitat, approximately 8 million acres are in land allocations that allow for management actions. This means only 20 percent of the 38.5 million acres

within the amendment area would be most affected by new management direction.

Factor 3: Goals, objectives and output
Determine whether the change alters long-term relationships between the levels of goods and services projected by the forest plan. Consider whether an increase in one type of output would trigger an increase or decrease in another. Determine whether there is a demand for goods and services not discussed in the forest plan.

The amendment would add one goal to forest plans; conserve Canada lynx. This goal is consistent with other goals in existing plans and other legal requirements to provide for habitat needs for threatened and endangered species. The amendment would add several objectives to the plans. These objectives require consideration of natural ecosystem process and functions and consideration of lynx habitat needs. The additional objectives provide more species specific guidance but do not alter the overall objectives to provide for habitat needs for threatened and endangered species.

The amendment would not substantially alter outputs for grazing, minerals, transportation systems and developed recreation areas, such as ski areas. These activities would not be prohibited by the amendment; however, habitat needs for lynx would need to be considered when managing these resources. The amendment would preclude expansion of snow-compacting activities such as snowmobiling, but it would not change the status quo. What is currently groomed or designated would not change, at least under alternative B. Under Alternatives C, D and E additional expansion would be allowed under certain conditions.

The amendment would allow precommercial thinning on an estimated 185,000 acres under Alternatives B, C and E and 420,000 acres under Alternative D over the next 10 years, compared to 580,000 under Alternative A. Based on past experience approximately 34 percent of the needed precommercial thinning (no action) is actually funded; therefore the amendment would not substantially change the acres actually thinned.

Factor 4: Management prescriptions
Determine whether the change in a management prescription is only for a specific situation or it would apply to future decisions throughout the planning area. Determine whether or not the change alters the desired future condition of the land and resources or the anticipated goods and services to be produced.

The amendment would apply to future decisions in lynx habitat and linkage areas throughout the planning area. The amendment does not change any Management Area (MA) designation. It does change the degree that some activities may occur within an MA. For example, it requires denning habitat be maintained at certain level. This standard could affect how much denning habitat could be removed, or where it should be retained, but it would not change MA designation. However, as noted in Chapter 3 for the

various resources the amendment is not likely to change the level of goods and services to be produced. It may increase the cost of managing for those goods and services.

Summary

Considering the four factors, adopting this amendment would not be a significant change under NFMA to the 18 plans being amended. This amendment is not a significant change under NFMA because it makes relatively minor changes in plan direction on a small proportion of the national forests. The new direction is a refinement of existing direction to maintain habitat for listed species, and does not alter management area designations or expected outputs. In addition, for all but one the direction will be of short duration.

Chapter 4 Consultation and Coordination

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Kim Foiles	FS, R1	GIS	20
Joe Gurrieri	FS, R1	Minerals	2
Cliff Mitchell	FS, R1	Recreation	25
Terry Nevius	FS, R1	Range	10
Mike Niccolucci	IMI (Inventory and Monitoring Institute)	Economics	20
Susan Rinehart	FS, R1	Botany	19
Laird Robinson	FS, R1	Public affairs	30
William Terrill	FS, R1	Forests	30

The following people provided technical support:

Name	Agency	Area of support
Brent Barney	FS, R4	Transportation
Larry Blocker	FS, R1	Recreation
Barry Bollenbacher	FS, R1	Silviculture
Fred Bower	FS, R1	Transportation
Renate Bush	FS, R1	FIA

List of preparers

Name	Agency	Area of support
Crista Braun	BLM, Idaho	GIS
Tom Buchta	FS, R4	Minerals
Jim Claar	FS, R1	Lynx
Tom Contreras	FS, R4	Recreation
John Courtright	BLM, Idaho	GIS
Gary Dickerson	FS, R1	Silviculture
Ron Erickson	FS, R1	Land acquisition
John Favro	FS, R1	Recreation
Brian Ferguson	FS, R4	Silviculture
Jeff Foss	FS, R4	Planning
Bruce Fox	FS, R1	Range
Julie Grodie	FS, R2	Wildlife
Bob Hamner	FS, R4	Range
Mike Hillis	FS, R1	Wildlife and fire
Melody Holm	FS, R2	Minerals
David Iverson	FS, R4	Economics
Paul Langowski	FS, R2	Fire
Rick Lasko	FS, R1	Fire
Jack Losensky	Contract consultant	Fire
Renee Lundberg	FS, R1	FIA
Mark Jensen	FS, R1	Ecosystem analysis
Ron Kay	BLM, Idaho	Range
Terry Knupp	FS, R1	Recreation
Pattie Koppenol	FS, R4	Fire
Kris Long	BLM, Idaho	Pubic affairs
Cynthia Manning	FS, R1	Social
John Martin	BLM	Economics
Kevin McKelvy	FS, RMRS	Lynx
Lynn Pisano-Pedigo	FS, R2	Public affairs
Chuck Quimby	FS, R2	Range
Mike Retzlaff	FS, R2	Economics
Tom Rhode	FS, R1	Planning
John Rupe	FS, R2	Planning
Ed Ryberg	FS, R2	Recreation
Julie Schaefers	FS, R2	Social
Kay Schiepan	BLM, Idaho	Recreation
Bruce Short	FS, R2	Silviculture
Helen Smith	FS, RMRS	Fire
John Squires	FS, RMRS	Lynx
Leslie Vaclulik	FS, R1	Minerals
Francisco Valenzuela	FS, R2	Recreation
Krista Gollnick-Waid	BLM	Fire
Greg Warren	FS, R2	Planning

The following people are members of the lynx biology team (members who wrote the Lynx Conservation Assessment and Strategy), and who provided technical clarifications on the LCAS:

Name	Agency
Kurt Broderdorp	FWS – R6
Jim Claar	FS - R1
Steve Gniadek	NPS – Glacier NP
Brian Holt	FWS – R1
Steve Mighton	FS – R9
Bob Naney	FS – R6
Joel Trick	FWS – R3
Anne Vandehey	FWS – R6
Fred Wahl	FS – WO
Nancy Warren	FS – R2
Dick Wegner	FS – R2
Joyce Whitney	BLM – Washington
Tom Wittinger	FS – R1

The following people are members of the oversight advisory group:

Name	Agency	Area of support
Rick Roberts	FS, R1	Planning
Cindy Swanson	FS, R1	Wildlife
Becky Aus	FS, R2	Planning
Marisue Hillard	FS, R2	Wildlife
Bill LeVere	FS, R4	Wildlife
Steve Solem	FS, R4	Planning
Ron Bolander	BLM, Utah	Wildlife
Jon Foster	BLM, Idaho	Planning
Kirk Garder	BLM, Utah	Planning

The Lynx and Wolverine Steering Committee, chaired by Kathy McAllister, R1 Deputy Regional Forester, also provided oversight and guidance. The Committee is an interagency committee comprised of FS, BLM, Park Service, FWS, and state representatives. The committee coordinates efforts for compiling scientific data, identifying and prioritizing research needs, recommending conservation measures, and updating existing plans.

Distribution List

County commissions — Idaho

Adams
Bear Lake
Benewah
Blaine
Boise
Bonner
Bonneville
Boundary
Butte
Caribou
Clark
Clearwater
Custer
Idaho
Jefferson
Kootenai
Latah
Lemhi
Lewis
Madison
Nez Perce
Shoshone
Teton
Valley

County commissions — Montana

Beaverhead
Broadwater
Carbon
Cascade
Chouteau
Deer Lodge
Fergus
Flathead
Gallatin
Glacier
Golden Valley
Granite
Jefferson
Judith Basin
Lake
Lewis and Clark
Lincoln
Madison
Meagher
Mineral
Missoula
Park
Pondera
Powell
Ravalli
Sanders
Silver Bow
Stillwater
Sweet Grass
Teton
Wheatland
Yellowstone

County commissions - Utah

Daggett
Duchesne
Summit
Uintah
Utah
Wasatch

County commissions – Washington

Pend Oreille

County commissions – Wyoming

Big Horn
Hot Springs
Johnson
Lincoln
Park
Sheridan
Sublette
Teton

Federal agencies

Army Corps of Engineers, Planning Division North Pacific Division
BLM Director's Office
BLM Idaho State Office
BLM Montana/Dakota State Office
BLM Utah State Office
BLM Wyoming State Office
Bureau of Reclamation
Environmental Protection Agency, Office of Federal Activities
Environmental Protection Agency, Region VIII
Environmental Protection Agency, Region VIII, Montana Office
Environmental Protection Agency, Region X
Federal Highway Administration, Western Region
HQ-USAF/LEEV, Environmental Division
National Park Service, Environmental Quality Division
National Park Service, Intermountain Region
National Park Service, Pacific West Region
Office of Deputy A/S of the USAF, Environment, Safety, Occupational Health
U.S. Department of Energy, Office of Environmental Compliance
U.S. Fish and Wildlife Service, Division of Environmental Coordination
U.S. Fish and Wildlife Service, Montana Field Office
U.S. Fish and Wildlife Service, Snake River Field Office
U.S. Fish and Wildlife Service, Wyoming Field Office
U.S. Fish and Wildlife Service, Region 1
U.S. Fish and Wildlife Service, Region 6
U.S. Geological Survey, Environmental Affairs Program
USDA Forest Service Environmental Coordination
USDA National Agricultural Library
USDA Office of Civil Right
USDI Natural Resources Library
USDI Office of Environmental Policy and Compliance
USDI Office of External and Intergovernmental Affairs

State agencies

Governor of Idaho
Idaho Office of Species Conservation
Idaho Department of Fish and Game
Idaho Department of Parks and Recreation
Idaho Department of Transportation

Governor of Montana
Montana Department of Natural Resources and Conservation
Montana Fish, Wildlife and Parks

Governor of Utah
Utah Department of Natural Resources

Governor of Wyoming
Wyoming Office of Federal Policy
Wyoming Business Council
Wyoming Department of Agriculture
Wyoming Department of Parks and Cultural Resources
Wyoming Game and Fish Department

Tribal governments

Arapahoe Business Committee
Blackfeet Tribal Business Council
Chippewa Cree Business Committee
Coeur d'Alene Tribe
Confederated Salish & Kootenai Tribes
Crow Tribal Council
Fort Belknap Community Council
Goshute Indian Tribe
Kalispell Tribe
Kootenai Tribal Council
Nez Perce Tribal Executive Committee
Northern Cheyenne Tribal Council
Northwest Band of Shoshoni Nation
Shoshone Business Council
Shoshone-Bannock Business Council
Shoshone-Paiute Tribes
Skull Valley Band of Goshutes
Tribal Council of the Te-Moak Western Shoshone
Ute Indian Tribe

United States representatives and senators

U.S. Representative Chris Cannon
U.S. Representative Barbara Cubin
U.S. Representative James Hansen
U.S. Representative Jim Matheson
U.S. Representative Butch Otter
U.S. Representative Dennis Rehberg
U.S. Representative Michael Simpson

U.S. Senator Max Baucus
U.S. Senator Robert Bennett
U.S. Senator Conrad Burns
U.S. Senator Mike Crapo
U.S. Senator Larry Craig
U.S. Senator Michael Enzi
U.S. Senator Craig Thomas
U.S. Senator Orrin Hatch

Organizations, businesses and others

Access for All
All Transportation Service, Inc.
Alliance for the Wild Rockies
America Outdoors
American Avalanche Institute, Inc.
American Council of Snowmobile Associations
American Society for Preservation of Cruelty to Animals
American Wildlands
Anaconda Snowmobile Club
Animal Protection Institute
Animal Voices
Antelope Butte Ski Area
Associated Logging Contractors
Back Country ATV Association, Inc.
Back County ATV Association
Beaverhead Sno-Riders
Big Hole Snowmobile Club
Big Horn Mountain Snowmads
Big Horn Snow-Goers
Big Sky Country Trail Preservers
Big Sky Snowriders
Bighorn Ski Area
Biodiversity Legal Foundation
Bitterroot Cross-Country Ski Club
Bitterroot Ridgerunners Snowmobile Club
Bjork, Lindley, Danielson & Little, P.C.
Blacktail Mountain Ski Area
Blue Ribbon Coalition
Blue Ribbon Coalition, Inc.
Blue Ribbon Flies

Bluewater Network
Bohart Ranch
Boone & Crockett Club
Boundary Backpackers
Bradford Environmental Research Institute
Bridger Bowl
Broadwater County Snowmobile Club
Broadwater Rod & Gun Club
Cabinet Backcountry Horsemen
Cabinet Ridge Riders
Campbell County Sno-Goers
Capital Trail Vehicle Association
Caribou County Sun
Casper Snow Gypsies
Center for Native Ecosystems
Central Montana Wildlands Association
Circle Snowmobile Club
City of Salmon
City of Stanley
Cody Country Krazy Sledders
Cody Nordic Ski Foundation
Coeur d'Alene Snowmobile Club
Cold Mountain, Cold Rivers
Colorado Off Highway Vehicle Coalition
Colorado State University
Committee For Idaho's High Desert
Conner Enterprises, Inc.
Cut Bank Snowmobile Club
Deer Lodge Snowmobile Club
Defenders of Wildlife
Discovery Basin Ski Corporation
Donnelly Snowmobile Club
Doney Law Firm
Dragging Y Cattle Company
East Pioneer Experimental Stewardship Program
Ecosystem Management Research Institute
Elkins Resort
Environmental Sciences, UMW
F.H. Stoltze Land and Lumber Company
Flathead Audubon Society
Flathead County Parks & Recreation
Flathead Resource Organization

Flathead Snowmobile Association
Flying B Ranch
Franklin County High markers
Friends of Pathways
Friends of the Clearwater
Friends of the King's Pond
Friends of the West
Friends of the Wild Swan
Fund for Animals, Inc.
Gallatin Valley Snowmobile
Gillette Internal Medicine Associates
Glacier County Title Company
Glacier Wilderness Resort
Grand Targhee Ski & Summer Resort
Great Burn Study Group
Great Falls Cross Country Club
Greater Yellowstone Coalition
Habitat Concepts, Inc.
Hagenbarth Livestock
Harriman State Park
Helena Snowdrifters
High Country Snowmobile Club
High Mountain Heli-Skiing
High Mountain Trail Association
High Mountain Trail Machine Association
High Uintas Preservation Council
Hills Resort
Humane Society of the United States
Hungry Horse Films
Idaho Cattle Association
Idaho Conservation League
Idaho County Snowmobile Advisory Commission
Idaho Environmental Council
Idaho Forest Owners Association
Idaho Outfitters & Guides Association
Idaho State Snowmobile Association
Idaho Trails Council
Idaho Wildlife Federation
Idaho Wildlife Society
Idaho Women in Timber
International Snowmobile Manufacturing Association

Izaak Walton Inn
Jackson Hole Conservation Alliance
Jackson Hole Locals Coalition
Jackson Hole Ski Corporation
Judith River Farm
Kasino Club
Kelly Canyon Ski Area
Kettle Range Conservation Group
Kootenai Environmental Alliance
Kootenai Winter Sports
Last Chance Nordic Ski Club
Lazy 4W Ranch
Lewiston, ID and Clarkston, WA Chambers of Commerce
Libby Rod & Gun Club
Lincoln County Snowcats
Lone Mountain Guest Ranch
Lookout Pass Ski & Recreation Area
Lost Trail Powder Mountain
Louisiana Pacific
Madison County Commissioners
Marion County Humane Society
Marshall Mountain Ski Corporation
Maverick Mountain
Meagher County Little Belters
Medicine Wheel Snogoers
Meeteese Recreation District
Midland Empire Snowgoers
Mile High Nordic Ski Club
Mission Mountain Chapter of Audubon Society
Mission Mountain Snowmobile Club
Missoula City Council Member Lou Ann Crowley
Missoula Nordic Ski Club
Missoula Snowgoers
Moco Engineering and Fabrication
Monarch & Associates
Montana Audubon Society
Montana Farm Bureau Federation
Montana House of Representative Daniel Fuchs
Montana Logging Association
Montana Mining Association, Missoula Chapter
Montana Multiple Use Association
Montana Night Riders

Montana Outfitter & Guide Association
Montana Public Lands Council
Montana River Action Network
Montana Shooting Sports Association
Montana Snowbowl
Montana Snowcat Club
Montana Snowmobile Association
Montana State Senator Jerry O'Neil
Montana Stockgrowers Association
Montana Trail Vehicle Riders Association
Montana Trails Association
Montana Trappers Association
Montana Wilderness Association
Montana Wildlife Federation
Montana Wildlife Society
Montana Wood Products Association
Montanans for Multiple Use
National Cattlemen's Beef Association
National Council of the Industry for Air and Stream Improvement, Clemson University
National Federation Wild Turkey
National Ski Area Association
National Trappers Association
Native Ecosystems Council
Native Forest Network Yellowstone Branch
North Fork Preservation Association
North Palouse Veterinary Clinic
Northwoods Wilderness Recovery
Noxon Rod & Gun Club
NW Ecosystem Alliance
Off-Highway Vehicles
Orofino Chamber of Commerce
Orofino Ridgerunners Snowmobile Club
Owens and Hurst Lumber Company
Pacific Northwest Trail Association
Park County Environmental Council
Petroleum Association of Wyoming
Phibbs Law Office P.C.
Ponderosa Snow Warriors
Powder River Snowbuffs
Predator Conservation Alliance
Priest Lake Chamber of Commerce

Priest Lake Golf Course
Priest Lake Trails Association
Public Lands Council
Purdy Ranches
Red Lodge Mountain
Red Lodge Race Camp
Red Lodge Snowgoers
Rich Ranch
Seeley Lake Driftriders
Sierra Club – Utah Chapter
Sierra Club – Wyoming Chapter
Sleeping Giant Corporation
Smokey Bear Ranch
Snow King Resort
Snowdrifters Snowmobile Club
Society for Conservation Biology
Southwestern Montana Stockman's Association
Snow Devils
Stanford University Biological Sciences
Steadman Diversities, Inc.
Stimson Lumber Company
Sublette Riders Association
Sundance Snowmobile Club
Swan View Coalition
Sweetgrass County Recreation Association
Ten Lakes Snowmobile Club
Teton Pass Ski Area, Inc.
The Big Mountain
The Ecology Center, Inc.
The Lands Council
The National Outdoor Leadership School
The Wildlife Society
Thirteen Mile Farm
Three Rivers Timber, Inc.
Timberstone Handcrafted Log Homes
Treasure Mountain Ski Search
Turner Mountain
United Four Wheel Drive Association
University of Colorado At Boulder
University of Montana Wildlife Biology Program
Upper Yellowstone Snowmobile Club
Utah Environmental Alliance

Utah Environmental Congress
Utah Snowmobile Association
Utah Wildlife Federation
Valley Cats
Vigilante Snowmobilers
Wallace Family Foundation
Wasatch Powderbird Guides
West Yellowstone Chamber of Commerce
Western Environmental Law Center
Western Environmental Trade Association
Western Montana Fish & Game Association
Western Watershed Project
White Pine Ski Area
Whitebark Pine Ecosystem Foundation
Wilderness Society
Wildlands Center for Preventing Roads
Wildlife Conservation Society
Wildlife Management Institute
Winter Riders, Inc.
Winter/Alpine Engineering Lab
Winter Wildlands Alliance
Wise River Jackpine Savages
Woodland Management
Wyoming Outdoor Council
Wyoming Snowmobile Association
Wyoming Wildlife Federation
Yellowstone Valley Audubon Society
Yostmark Backcountry Tours

Glossary

Age class – An age class is an age grouping of trees according to an interval of years, usually 20. The trees are within 20 years of the same age, 1-20 years, 21-40 years, etc.

Allotment (range allotment) – An allotment is the area designated for grazing by a certain number of livestock for a given period.

Areas of consistent snow compaction – An area of consistent snow compaction is an area of land or water that during winter is generally covered with snow and gets enough human use that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after (within 48 hours) snowfall. These can be areas or linear routes, and are generally found in near snowmobile or cross-country ski routes, in adjacent openings, parks and meadows, near ski huts or plowed roads, or in winter parking areas. Areas of consistent snow compaction will be determined based on the area or miles used in 1998, 1999 or 2000.

BA (Biological Assessment) – BA "refers to the information prepared by or under the direction of the Federal agency concerning listed and proposed species and designated and proposed critical habitat that may be present in the action area and the evaluation (of) potential effects of the action on such species and habitat." (50 CFR Part 402.02)

BO (Biological Opinion) – BO "is the document that states the opinion of the (US Fish and Wildlife) Service as to whether or not the Federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat." (50 CFR Part 402.02)

Broad scale assessment – A broad scale assessment is a synthesis of current scientific knowledge, including a description of uncertainties and assumptions, to provide an understanding of past and present conditions and future trends, and a characterization of the ecological, social and economic components of an area. (LCAS)

Browse – Browse is the twigs, leaves and young shoots of trees and woody shrubs that animals eat or browse upon.

Canopy – The canopy is the part of any stand of trees represented by the crowns. It usually refers to the topmost layer.

Carr – A carr is a deciduous woodland or shrub land occurring on permanently wet, organic soil. (Helms 1998 and LCAS)

Cavity – A cavity is a hole in a tree often used by wildlife, usually birds, for nesting and roosting.

Climax – Climax is the culminating stage in plant succession for a given site. Climax vegetation is stable, self-maintaining and self-reproducing.

Coarse woody debris – Coarse woody debris is large pieces of dead woody

material, such as dead tree trunks, limbs and root masses on the ground or in streams. (Helms 1998 and LCAS)

Commercial thinning – Commercial thinning is tree thinning where the cut trees are sold.

Commercial products, commercial timber sale – Commercial products are timber products that can be sold. A commercial timber sale is cutting and selling trees as timber products, bringing revenue to the government.

Condition class – Condition class is a description of how the land has departed from historic conditions based on the number of missed fire cycles (average fire-return intervals) and the amount of change in forest structure and species composition. (Schmidt et al. 2002)

Conifer – A conifer is a tree that produces cones, such as a pine, spruce or fir. Most conifers have needles instead of leaves.

Coniferous – A coniferous forest is one consisting primarily of conifer trees.

Connectivity (of habitats) – Connectivity is the linkage of similar but separated vegetation stands by patches, corridors or "stepping stones" of like vegetation. This term can also refer to the degree to which similar habitats are linked.

Cover – Cover is any feature that conceals wildlife or fish. Cover may be dead or live vegetation, boulders or undercut streambanks. Animals use cover to escape from predators, rest or feed.

Cover type – Cover type refers to stands of a particular vegetation type that are composed of similar species. The aspen cover type contains plants distinctly different from the subalpine fir cover type.

Crown – The crown is the top part of a tree where the leaves or needles grow.

Crown fire – A crown fire is the movement of fire through the crowns of trees or shrubs more or less independently of a surface fire. When the crown burns, the tree usually dies. (National Wildfire Coordinating Group 1996)

Cumulative effects – Cumulative effects are environmental consequences that result from the incremental impact of an action added to other past, present and reasonably foreseeable future actions, regardless of which federal or non-federal agency or person takes such action(s). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR 1508.7)

Daylight thinning – Daylight thinning is a form of precommercial thinning that removes trees and brush inside a given radius around a tree.

Decommission – To decommission is to stabilize and restore unneeded roads to a more natural state (36 CFR 212.1), or to permanently remove roads and their roadbeds.

Denning habitat (lynx) – Denning habitat is the environment lynx use when giving birth and rearing kittens until they are mobile. The most common component is large amounts of coarse woody debris to provide escape and thermal cover for kittens. Denning habitat must be within daily travel distance of winter snowshoe hare habitat – the typical maximum daily

distance for females is about three to six miles. Denning habitat includes mature and *old growth* forests with plenty of coarse woody debris. It can also include young regenerating forests with piles of coarse woody debris, or areas where down trees are jack-strawed.

Designated over–the–snow routes – Designated over-the-snow routes are routes managed under permit or agreement or by the agency, where use is encouraged, either by on-the-ground marking or by publication in brochures, recreation opportunity guides or maps (other than travel maps) or in electronic media produced or approved by the agency. The routes identified in outfitter and guide permits are designated by definition; groomed routes also are designated by definition. The determination of baseline snow compaction will be based on the miles of designated over-the-snow routes authorized, promoted or encouraged in 1998, 1999 or 2000.

Designated play areas – Designated play areas are places identified for winter recreation, such as tubing or snowmobiling, but which are not developed ski areas.

Designated route – A designated route is a road or trail that has been identified as open for specified travel use.

Developed recreation – Developed recreation requires facilities that result in concentrated use. For example, skiing requires lifts, parking lots, buildings and roads; campgrounds require roads, picnic tables and toilet facilities.

Development, mineral – Development is the work required to prepare a mineral deposit for production. This may include driving underground workings, stripping the overburden from deposits that will be open-pit or strip mined, building waste dumps and constructing milling and transporting facilities. Oil or gas development occurs through a series of production wells.

Developmental allocations – Developmental allocations are the allotments of federal lands made in land management plans that allow developments like campgrounds and active management like timber sales.

Direct effects – Direct effects are caused by an action and occur at the same time and place. (40 CFR 1508.8)

Dispersed recreation – Dispersed recreation is a form of outdoor recreation taking place away from the developed sites or areas that support concentrated recreational use. It may require facilities for keeping visitors safe, protecting resources and enhancing the quality of the visitor experience. (LCAS) It includes activities like hunting, backpacking and scenic driving.

Disturbance – A disturbance is any event that alters the structure, composition or function of a habitat. Natural disturbances include drought, floods, wind, wildfires, wildlife grazing, and insects and pathogens. Human-caused disturbances include timber harvest, wildland fire use, livestock grazing, road construction and the introduction of exotic species. (LCAS)

Diurnal security habitat (lynx) – Diurnal security habitat amounts to places in lynx habitat that provide secure winter daytime bedding sites for lynx in highly disturbed landscapes like ski areas. Security habitat gives lynx the ability to retreat from human disturbance during the day, so they can emerge at dusk to hunt when most human activity stops. Forest structures that make human access difficult generally discourages human activity in security habitats. Security habitats are most effective if big enough to provide visual and acoustic insulation and to let lynx easily move away from any intrusion. They must be close to winter snowshoe hare habitat. (LCAS)

Ecological process – An ecological process is the flow and cycling of energy, materials and organisms through an ecosystem. (LCAS)

Even-aged harvest – Even-aged harvest is timber cutting that creates stands of trees essentially all the same age. Clearcuts and seed tree cuts are even-age harvests.

Exploration, mineral – Exploration is physically searching for minerals. It often includes building roads, drill pads, underground workings and trenching.

Fire behavior – Fire behavior is how fire reacts to fuel, weather and topography. (National Wildfire Coordinating Group 1996)

Fire frequency – Fire frequency is how often fire burns a given area, often termed the *fire-return interval.*

Fire regime – Fire regime is a general description of the characteristic pattern of fire: how often (frequency); how hot (intensity); and how big (scale). (Fischer and Bradley 1987; Smith and Fisher 1997; Jones and Barrett, in press)

Fire risk – The fire risk is the likelihood a fire would occur in an area based on the historic fire record data, and defined in terms of whether a stand supports crown fire.

Fire use – Fire use is the combination of wildland fire use and using prescribed fire to meet resource objectives. (National Interagency Fire Center 1996)

Firebreak – A firebreak is a natural or constructed discontinuity in potential fuels that segregates, stops, and controls the spread of fire or provides a control line from which to control the fire. (Helms 1998)

Forage – Forage is the browse and non-woody plants eaten by wildlife and livestock.

Foraging habitat (lynx) – Foraging habitat is habitat that supports lynx primary prey – snowshoe hare – and alternate prey, especially red squirrels. The highest quality snowshoe hare habitat contains a high density of young trees or shrubs that are tall enough to protrude above the snow in winter. Red squirrel densities tend to be highest in mature cone-bearing forests with substantial quantities of coarse woody debris. (LCAS)

Forb – A forb is a broadleaf plant with little or no woody material in it.

Forest highway – A forest highway is a forest road under the jurisdiction of, and maintained by, a public authority and open to public travel (USC: Title 23,

Section 101(a)), designated by an agreement with the FS, state transportation agency and Federal Highway Administration.

Forest road – Any road wholly or partly within, adjacent to or serving the NF road system and which is necessary for the protection, administration and use of the NF road system and using and developing NF resources. (FSM 7705)

Forested stringer – A forested stringer is a narrow band of trees that connects to other patches of trees.

Fuel loading – Fuel loading is the amount of fuels on the forest floor, consisting of generally dead needles, twigs, branches and logs.

Fuel treatment – A fuel treatment is a management action that reduces the threat of ignition and fire intensity or rate of spread, or is used to restore fire-adapted ecosystems.

Goal – A goal is a broad description of what an agency is trying to achieve, found in a land management plan. (LCAS)

Gramminoid – Grasses and grass-like plants.

Groomed route – Groomed routes are designated over-the-snow routes on which the snow surface is packed, leveled or scarified, with or without "set tracks", usually by equipment towed behind a snowmobile or snow-cat. Snow roads maintained by permitted snow-cat tours are considered groomed routes. The determination of the maximum miles of groomed routes will be based on the maximum number of miles authorized, promoted or encouraged in 1998, 1999 or 2000.

Guideline – A guideline is a particular management action that should be used to meet an objective found in a land management plan. The rationale for deviations may be documented, but amending the plan is not required. (LCAS modified).

Habitat connectivity (lynx) – Habitat connectivity consists of an adequate amount of vegetative cover arranged in a way that allows lynx to move around. Narrow forested mountain ridges or shrub-steppe plateaus may serve as a link between more extensive areas of lynx habitat; wooded riparian areas may provide travel cover across open valley floors. (LCAS)

Highway – The word *highway* includes all roads that are part of the National Highway System. (23 CFR 470.107(b).

Home range – Home range is the area used by an individual in its normal activities of foraging, mating and rearing its young, either during the entire year or seasonally. (LCAS)

HUC (Hydrologic unit code) – HUCs are a hierarchical coding system developed by the U.S. Geologic Survey to identify the geographic boundaries of watersheds of various sizes. The Columbia River is a 1st–code HUC, draining more than 165,000,000 acres. The Lower Snake River, one of the Columbia's major tributaries, is a 2nd-code HUC, draining more than 22,000,000 acres; the Salmon River is a 3rd code HUC, draining almost 9,000,000 acres; and the Upper Grande Ronde River

is a 4th-code HUC, draining just over 1,000,000 acres.

Indirect effects – Indirect effects are caused by an action and are later in time or further removed in distance, but are still reasonably foreseeable. (40 CFR 1508.8)

Isolated mountain range – Isolated mountain ranges are small mountains cut off from other mountains and surrounded by flatlands. On the east side of the Rockies, they are used for analysis instead of sub-basins. Examples are the Little Belts in Montana and the Bighorns in Wyoming.

Ladder fuels – Ladder fuels consist of vegetation below the tree crowns, which can carry fire from the forest floor into the crowns. Ladder fuels may be low branches, shrubs and smaller trees, or dead material that hasn't fallen down to the forest floor.

Land ownership adjustments – *Adjusting* land ownership means NF or BLM lands are sold or exchanged, or private lands are acquired, so the landowner changes.

Landscape connectivity – see habitat connectivity

LAU (Lynx Analysis Unit) – An LAU is an area of at least the size used by an individual lynx, from about 25 to 50 mi^2 (LCAS). An LAU is a unit for which the effects of a project would be analyzed; its boundaries should remain constant.

Leasable minerals – Leasable minerals are federally owned fossil fuels (oil, gas, coal, shale, etc.) geothermal resources, sulfur, phosphates and uranium.

Linkage area – Linkage areas provide connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas, where basins, valleys or agricultural lands separate blocks of lynx habitat, or where lynx habitat naturally narrows between blocks. (LCAS updated definition approved by the Steering Committee 10/23/01).

Locatable minerals – Locatable minerals are deposits such as gold, silver, copper and other metals.

Low speed, low traffic volume road – *Low speed* is less than 20 miles per hour; *low volume* is a seasonal average daily traffic load of less than 100 vehicles per day.

Lynx habitat – Lynx habitat occurs in mesic coniferous forest that experience cold, snowy winters and provide a prey base of snowshoe hare. In the northern Rockies, lynx habitat is generally occurs between 3,500 and 8,000 feet of elevation, and primarily consists of lodgepole pine, subalpine fir and Engelmann spruce. It may consist of cedar-hemlock in extreme northern Idaho, northeastern Washington and northwestern Montana, or of Douglas fir on moist sites at higher elevations in central Idaho. It may also consist of cool, moist Douglas fir, grand fir, western larch and aspen when interspersed in subalpine forests. Dry forests do not provide lynx habitat. (LCAS)

Lynx habitat in an unsuitable condition – *Lynx habitat in unsuitable condition* consists of lynx habitat in the stand initiation structural stage where the trees are generally less than ten to 30 years old and

have not grown tall enough to protrude above the snow during winter.

Stand replacing fires or certain vegetation management projects can create unsuitable conditions. Vegetation management projects that can result in unsuitable habitat include clearcuts and seed tree harvest, and sometimes shelterwood cuts and commercial thinning depending on the resulting stand composition and structure (LCAS).

Maintain – In the context of this amendment, to *maintain* means to provide enough lynx habitat to conserve lynx. It does not mean to keep the status quo.

Maintenance level – Maintenance levels define the level of service provided by and maintenance required for a road. (FSH 7709.58, Sec 12.3)

Maintenance level 1 – Maintenance level 1 is assigned to intermittent service roads when they are closed to vehicular traffic for more than one year. Such roads may be open to and suitable for non-motorized use. Basic custodial maintenance is performed to perpetuate the road and to keep the damage to adjacent resources to an acceptable level, with the emphasis on maintaining drainage facilities and runoff patterns. Planned road deterioration may occur.

Maintenance level 2 – Maintenance level 2 is assigned to roads open for use by high-clearance vehicles, where passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of administrative, permitted, dispersed recreation or other specialized uses. Log haul may occur at this level.

Maintenance level 3 – Maintenance level 3 is assigned to roads that are open to and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with native or processed material.

Maintenance level 4 – Maintenance level 4 is assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. Some may be single lane; some may be paved or have dust abated.

Maintenance level 5 – Maintenance level 5 is assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-lane and paved, but some may be aggregate surfaced with the dust abated.

Management action – A management action is any activity undertaken as part of the administration of public lands.

Management direction – Management direction is a formal statement of goals and objectives, and the associated standards and guidelines for obtaining them, found in a land use or other plan, law or other guiding document.

Map & field–validate – To *map* is to identify and locate certain conditions on a map. To *field-validate* is to sample on the

ground a representative number of areas, using an acceptable sampling method, to make sure the mapped areas truly contain the conditions that were mapped. Not every acre has to be field-validated.

Mesic – *Mesic* describes environmental conditions with a medium supply of moisture, as opposed to *xeric* (dry) or *hydric* (wet).

Mid-seral or later – Mid-seral is the successional stage in a plant community that's the midpoint as it moves from bare ground to climax. For riparian areas, it means willows or other shrubs have become established. For shrub-steppe areas, it means shrubs associated with climax are present and increasing in density.

Mineral materials – Mineral materials are common materials such as stone, gravel, clay, cinders and decorative rock.

Mitigation – Mitigation is an action taken to avoid, minimize or repair the impact of a management activity.

Mixed–severity fire regime – A fire regime where a mix of understory and stand-replacing fires burn about every 35 to 100 years, or intermediate-intensity fires may burn, which kill fire-susceptible trees while the fire-resistant trees survive.

Multistoried – A multistoried forest is one with both an *overstory* of tall trees and a dense undergrowth, or *understory*, of shorter trees and shrubs.

No–action alternative – The no-action alternative means taking no action to resolve the problem described in the purpose & need. It represents the most likely condition expected to exist in the future if current management practices continue unchanged.

Non–developmental allocations – Non-developmental allocations are the allotments of federal lands made in land management plans where natural disturbance processes predominate and active management, like timber sales, may not occur. Allocations generally include wilderness, roadless and semi-primitive non-motorized areas.

Objective – An objective is a statement in a land management plan describing desired resource conditions and intended to promote achieving programmatic goals. (LCAS)

Older multistoried forests – Older multistoried forests are forests in the *understory reinitiation* or *old forest, multistoried* structural stages

Old growth – Old growth forests generally contain trees that are large for their species and site, and are sometimes decadent with broken tops. Old growth often contains a variety of tree sizes, large snags and logs, and a developed and often patchy understory.

Old forest, multistoried structural stage – Many age classes and vegetation layers mark the old forest, multistoried stage, and it usually contains large old trees. Decaying fallen trees may also be present that leave a discontinuous overstory canopy. On cold or moist sites without frequent fires or other disturbance, multi-layer stands with large trees in the uppermost layer develop. (Oliver and Larson, 1996)

Old forest, single–storied structural stage Old forest, single-storied stage usually contains large old trees with little understory. Decaying fallen trees may be present, leaving a discontinuous overstory canopy. A single-layer stand evolves under the influence of frequent, recurring surface fires or other disturbance. (Oliver and Larson, 1996)

Overstory – The overstory is the upper canopy layer; the plants below comprise the *understory*.

Peer review – Peer review is the independent consideration and evaluation of a scientific article by more than one other expert in the same field of study. If the reviewers find the article to be reasonable in its descriptions of research methods, findings and conclusions, it's been *peer reviewed*. The reviewing experts must be independent of the author and should be anonymous. In a reputable scientific journal, an article will not be published until it's been peer reviewed.

Permanent development – A permanent development is any development that results in a loss of lynx habitat for at least 15 years. Ski trails, parking lots, new permanent roads, structures, campgrounds and many special use developments would be considered permanent developments.

PCT (precommercial thinning) – Precommercial thinning is mechanically removing trees to reduce stocking and concentrate growth on the remaining trees, and not resulting in immediate financial return. (Helms 1998)

Predator – A predator is an animal that lives by preying on other animals.

Prescribed fire – A prescribed fire is any fire ignited as a management action to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements met, before ignition. The term replaces *management ignited prescribed fire*. (National Wildfire Coordinating Group 1996)

Production, minerals – Producing minerals is removing the minerals from the ground, making them available for processing and consumption.

Programmatic – *Programmatic* is the broad management direction in land management plans – it provides the overall guidance for resource management programs, practices, uses and protection measures. It differs from project-level direction, which provides guidance about a certain project in a particular place.

Prospecting – Prospecting is finding an area with potential for mineral development – it takes place before *exploration*. It involves limited surface disturbance, such as geologic mapping, soil or water sampling, or collecting seismic data.

Public authority – A public authority is a federal, state, county, town or township, Indian tribe, municipal or other local government or instrumentality thereof, with authority to finance, build, operate or maintain highway facilities. (23 CFR 460.2(b))

Public road – A public road is any road or street under the jurisdiction of and

maintained by a public authority and open to public travel. (FSM 7705)

Reclamation, minerals – Reclaiming means restoring areas disturbed by mineral exploration, development and production.

Red squirrel habitat – Red squirrel habitat consists of coniferous forests of seed and cone-producing age that usually contain snags and downed woody debris, generally associated with mature or older forests.

Regeneration – Regeneration is the re-growth of trees on a disturbed or deforested site.

Regeneration harvest – Regeneration harvest is cutting trees and creating an entire new age class; an even-age harvest. The major methods are clearcutting, seed tree, shelterwood and group selective cuts. (Helms 1998)

Release – To release means to remove the competing vegetation to allow a desired species to grow, similar to weeding a garden. A tree undergoes *release* when it re-enters a period of rapid growth after competing vegetation has been removed.

Research – Research consists of studies conducted to increase scientific knowledge or technology. For the purposes of Standards VEG S5 and VEG S6, *research* applies to studies financed from the forest research budget, and to administrative studies financed by the NF budget.

Responsible official – The responsible official is a federal employee who's been delegated the authority to make the decision about a specific planning action.

Restore, restoration – To restore is to return or re-establish ecosystems or habitats to their original structure and species composition. (Helms 1998)

Restoration tools – Restoration tools are actions such as prescribed fires or thinning used to modify an ecosystem to achieve a desired, healthy and functioning condition.

Restricted road – A restricted road is a road or segment where a certain type of use or all uses are prohibited during certain seasons of the year or yearlong.

Riparian area – A riparian area is the distinctive soil and vegetation between a stream or other body of water and the adjacent upland. It includes wetlands and the parts of the floodplains and valley bottoms that support riparian vegetation (LCAS), which typically consists of various emergent aquatic plants, as well as the grasses, sedges and shrubs that thrive close to water.

Road – A road is a motor vehicle travel way greater than 50 inches wide unless its designated and managed as a trail. A road may be classified, unclassified or temporary. (36 CFR 212.1)

Road density – Road density is the miles of road found in an area of land that's one square mile.

Road improvement – A road improvement changes a road so that its original design function is altered, its traffic-service level increases or its capacity expands. (FSM

7705) Road *maintenance* has none of these results.

Road reconstruction – Road reconstruction is improving or realigning an existing classified road. (FSM 7700)

Roads Analysis Process – Roads analysis is a scientific procedure for evaluating the ecologic, social, and economic impacts from roads and road systems. The analysis doesn't result in a decision but helps inform management decisions.

Salvage harvest – Salvage harvest is a commercial timber sale of dead, damaged or dying trees. It recovers economic value that would otherwise be lost. Collecting firewood for personal use is not considered salvage harvest.

Sapling – A sapling is a tree that's between one and five inches in diameter.

Seedling – A seedling is a tree that's less than one inch in diameter.

Semi–primitive non–motorized – A way to characterize an area with a predominately natural or natural-appearing environment, where motorized use is not permitted.

Seral – Seral is a temporary, intermediate stage in the process of succession. (Helms 1998)

Shade tolerant – Shade tolerant is a plant species that doesn't require abundant sunlight to grow, such as cedar and hemlock.

Shrub steppe habitat – Shrub steppe habitat consists of dry sites with vegetation of intermingled shrubs and grasslands.

Site–specific – Site specific means tied to or involving a certain place. The term is applied to project analysis.

Ski area – A site and attendant facilities expressly developed to accommodate alpine or Nordic skiing. (LCAS)

Snowshoe hare habitat – Snowshoe hare habitat consists of places where young trees or shrubs grow densely, thousands of woody stems per acre.

Special use authorization – A special use authorization is a permit, easement or other written instrument that grants rights or privileges for occupying and using NF or BLM land, subject to specified terms and conditions. (FSM 2705)

Stand – A stand is a group of trees occupying a certain area that's similar in species, age and condition.

Stand composition – Stand composition is the proportion of each tree species expressed as a percentage of the total number, basal area or volume of the stand. (Helms 1998)

Stand–replacing fire regime – A stand-replacing fire regime is one where infrequent, high-intensity fires burn about every 35 to 200+ years, killing most trees and substantially changing the forest structure.

Standard – A standard is a required action in a land management plan specifying how to achieve an objective or under what circumstances to refrain from taking action. A plan must be amended to deviate from a standard.

Stand initiation structural stage – The stand initiation stage develops after a

stand-replacing disturbance by fire or regeneration timber harvest. A new single-story layer of shrubs, tree seedlings and saplings establish and develop, reoccupying the site. Trees that need full sun are likely to dominate these even-aged stands. (Oliver and Larson, 1996)

Stand structure – Stand structure is the horizontal and vertical distribution of the components of a forest stand, including the height, diameter, crown layers and stems of trees, shrubs, and herbaceous understory, snags and down woody debris. (Helms 1998)

Stem exclusion structural stage – In the stem exclusion stage, trees initially grow fast and quickly occupy all of the growing space, creating a closed canopy. Because the trees are tall, little light reaches the forest floor so understory plants (including smaller trees) are shaded and grow more slowly. Species that need full sunlight usually die; shrubs and herbs may become dormant. New trees are precluded by a lack of sunlight or moisture. (Oliver and Larson, 1996)

Succession – Succession is the natural replacement, in time, of one plant community with another. Conditions in the existing plant community (or successional stage) create conditions favorable for establishing the next stage.

Successional stage – A successional stage is a normal, expected phase in the development of a plant community as it moves from bare ground to climax. The grass-forb stage precedes the woody shrub stage.

Suitable timber base – Suitable timber base are lands that have been deemed appropriate for *timber management*.

Surface fire – A surface fire spreads through surface fuels, not into the upper branches and crowns of trees.

Surface fuels – Surface fuels are needles, leaves, grass, forbs, dead and down branches and trees, stumps, shrubs and short trees.

Temporary road – A temporary road is a road not intended to be a part of the forest transportation system and not needed for long-term resource management. (36 CFR 212.1, FSM 7705)

Thermal cover – Thermal cover is cover that helps protect animals from weather. It shields them from harsh winds and precipitation and helps them conserve body heat.

Timber management – Timber management consists of growing, tending, commercially harvesting and regenerating crops of trees.

Transition zone – A transition zone is the area where the predominant species changes from one to another.

Two–aged harvests – Two-age harvests are clearcuts, seed tree cuts and shelterwood cuts that retain some overstory trees. They retain structural diversity and result in a two-aged stand when an understory of younger trees begins to grow.

Type conversion – Type conversion is changing the dominant vegetation in a place from forested to non-forested or from one species to another.

Understory – An understory consists of the trees and woody shrubs growing beneath the *overstory* in a stand of trees.

Understory fire regime – An understory fire regime is one where the understory burns frequently, from once a year to about every 35 years, with low-intensity surface fires that consume forest litter and kill small trees. Understory fires generally do not kill large, fire-resistant trees or substantially change the stand structure.

Understory re–initiation structural stage – In the understory reinitiation stage, a new age class of trees gets established after overstory trees begin to die, are removed or no longer fully occupy their growing space after tall trees abrade each other in the wind. Understory seedlings then re-grow and the trees begin to stratify into vertical layers. A low to moderately dense uneven-aged overstory develops, with some small shade-tolerant trees in the understory. (Oliver and Larson, 1996)

Understory thinning – Understory thinning, or thinning from below, removes small trees growing under taller ones, to remove ladder fuels or to improve the health and vigor of the overstory. Understory thinning may or may not provide commercial products.

Uneven–aged harvest – Uneven-age harvests remove trees with commercial value either individually or in groups. They maintain a multi-age structure by removing some trees of all sizes and by regenerating the openings. They retain structural diversity and result in a stand with several age classes. *Uneven-aged management* creates multi-aged, multi-storied forests.

Unsuitable lynx habitat – *Unsuitable* lynx habitat consists of lynx habitat in the stand initiation structural stage where the trees are generally less than ten to 30 years old and have <u>not</u> grown tall enough to protrude above the snow during winter.

Stand replacing fires or certain vegetation management techniques can create unsuitable lynx habitat. Vegetation management projects that can result in unsuitable habitat include clearcuts and seed tree harvest, and sometimes shelterwood cuts and commercial thinning depending on the resulting stand composition and structure (LCAS).

Unsuitable lands – Unsuitable lands have been classified as inappropriate to manage for a particular resource use. For the FS, *unsuitable lands* are those <u>not</u> managed for timber production for reasons of policy, ecology, technology, silviculture or economics.

Valid existing rights – Valid existing rights are a definable legal interest established or existing through statute, real estate transactions, federal grants and leases.

Vegetation management projects – Vegetation management consists of timber and fire management projects that change the composition and structure of vegetation to meet specific objectives, by means of prescribed fire, timber harvest, precommercial thinning, etc. For the purposes of this amendment, the term does <u>not</u> include removing vegetation for permanent developments like mineral

operations, ski runs, roads and the like, and does not apply to fire suppression or wildland fire use.

Watershed – A watershed is the entire region drained by a waterway or into a lake or reservoir. Above a point on a stream, it's the area contributing water to the stream.

Wildland fire – A wildland fire is any fire burning in the wildlands that's not a prescribed fire or a structural fire. This term encompasses fires previously called *wildfires*. (National Interagency Fire Center 1998)

Wildland fire use – Wildland fire use is managing naturally ignited wildland fires to accomplish resource management objectives in areas that have a fire management plan. This term replaces *prescribed natural fire*. (Wildland and Prescribed Fire Management Policy, August 1998)

Willow carr – A willow carr consists of willows growing on permanently wet, organic soil.

Winter snowshoe hare habitat – Winter snowshoe hare habitat consists of places where young trees or shrubs grow dense – thousands of woody stems per acre – and tall enough to protrude above the snow during winter, so hares can browse on the bark and small twigs (Ruediger et al. 2000). Winter snowshoe hare habitat develops primarily in the stand initiation, understory reinitiation and old forest multistoried structural stages.

WUI (Wildland urban interface) – The WUI is the line, area or zone where structures and other human developments meet or intermingle with undeveloped wildland or vegetative fuels. (National Interagency Fire Center 1996) For this analysis the WUI was defined as the zone within a mile of where people live, liberally measured as just one structure per ten square miles.

Young regenerating forest – A young regenerating forest is a forest in the *stand initiation* structural stage

Young forest multistoried structural stage – In the young forest, multistoried stage, three or more layers of trees become established because of minor disturbances that cause some mortality in the overstory, perpetuating a multi-layer, multi-aged stand structure. A broken overstory layer with a mix of tree sizes characterizes this stage. Large trees are scarce. This stage likely has shade tolerant trees in the understory. (Oliver and Larson, 1996)

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List of acronyms

Acronym	Title	What it is
AIRFA	American Indian Religious Freedom Act	Law
BA	Biological assessment	Document
BBER	Bureau of Business & Economic Research	Subset of Economics Department at University of Montana
BLM	Bureau of Land Management	USDI agency
BO	Biological opinion	Document
CEQ	Council on Environmental Quality	Federal department
CFR	Code of Federal Regulations	Set of regulations
DEIS	Draft environmental impact statement	Document
DNA	Di-nuclyorubonucleic acid	Genetic material
DNRC	Department of Natural Resources and Conservation	State department
EIS	Environmental impact statement	Document
ESA	Endangered Species Act	Law
FIA	Forest inventory and analysis	Vegetation data
FLPMA	Federal Land Policy Management Act	Law
FS	Forest Service	USDA agency
FSH	Forest Service Handbook	Set of procedures
FSM	Forest Service Manual	Set of policies
FWS	U.S. Fish and Wildlife Service	USDI agency
GIS	Geographic information system	Mapping tool
HCP	Habitat conservation plan	Document
HUC	Hydrologic unit code	Watershed descriptor
ID	Interdisciplinary "team"	Group of people
IMI	Inventory and Monitoring Institute	Administrative subset of FS
IMPLAN	Impact Analysis for Planning	Computer program
INFISH	Inland Native Fish Strategy	Document
LAU	Lynx analysis unit	Lynx habitat descriptor
LCAS	Lynx Conservation Assessment and Strategy	Document
MIS	Management indicator species	Plant or animal
MOU	Memorandum of understanding	Agreement
NEPA	National Environmental Policy Act	Law
NHPA	National Historic Preservation Act	Law
NF	National Forest	Administrative unit
NFMA	National Forest Management Act	Law
NIFC	National Interagency Fire Center	Administrative subset of FS & BLM

Acronym	Title	What it is
NRHP	National Register of Historic Places	
NWCG	National Wildfire Coordinating Group	Administrative working group
OHV	Off Highway Vehicle amendment	Document
PACFISH	Interim Strategy for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California	Document
TES	Threatened, endangered, sensitive – also TEPS threatened, endangered, proposed and sensitive	Plant or animal
TPA	Tree per acre	Unit of measure
TSMRS	Timber stand management record system	Data base
USDA	United States Department of Agriculture	Federal department
USDC	United States Department of Commerce	Federal department
USDI	United States Department of Interior	Federal department
USDL	United States Department of Labor	Federal department
WUI	Wildland urban interface	Area of land

Appendices

Appendix A – Crosswalk between the LCAS, the scoping proposed action & the DEIS Proposed Action, Alternative B

Developing the scoping proposed action

The scoping proposed action was developed in September 2001 based on the recommendations in the LCAS (Lynx Conservation Assessment and Strategy). The recommendations were fine tuned to include only those items that are truly plan decisions, to reduce redundancy and to provide clarity.

6) Plan decisions

Plan decisions guide or limit selection of projects. The following criteria were used to determine if direction in the LCAS was a plan decision:

Objectives

- Does it describe resources outcomes to achieve? If so, include.
- Does it describe how to map lynx habitat? If so, do not include, because how to map lynx habitat is an inventory process not a plan decision.
- Does it describe an analysis or planning process that should be conducted? Analysis processes are generally not plan decisions in that they don't set the framework for desired conditions, or sideboards for project implementation. However, include as a standard if the process is a prerequisite for a type of project.

Standards

- Does it set sideboards for project implementation? If so, include.

Some word changes were made to reflect plan decisions instead of a conservation strategy. For example, "conservation measures" were changed to "management direction."

7) Redundancy

Each recommendation was evaluated to see if it was already addressed by another recommendation, already addressed by manual or handbook direction, or could be combined. This occurred frequently because of the way the LCAS was organized.

8) Clarity

Some of the wording was changed to provide clearer direction based on the experience of using the LCAS over the last few years.

Developing the DEIS Proposed Action, Alternative B

During scoping, both the public and agency employees raised questions about the clarity of objectives, standards and guidelines in the initial proposed action. The ID team found ways to reword them to make them clearer, without changing the intent or effects.

Some of the guidelines were rewritten to state them more clearly as guidelines, those actions that "should" be done a certain way, versus "must" be done that way. Others were added because they'd been inadvertently omitted from the original proposed action, or were modified in the LCAS after September 2001.

Table A-1. Crosswalk between the LCAS, the scoping proposed action and the DEIS Proposed Action, Alternative B

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
	All Programs	
Programmatic objectives for all		
1. Design vegetation management strategies that are consistent with historical succession and disturbance regimes. The broad-scale strategy should be based on a comparison of historical and current ecological processes and landscape patterns, such as age-class distributions and patch size characteristics. It may be necessary to moderate the timing, intensity, and extent of treatments to maintain all required habitat components in lynx habitat, to reduce human influences on mortality risk and interspecies competition, and to be responsive to current social and ecological constraints relevant to lynx habitat.	**Vege O3**. Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat. **Vege O1**. Maintain suitable acres and juxtaposition of lynx habitat through time, with an emphasis on continued availability of high quality foraging habitat in proximity to denning habitat. **Vege O5.** Design regeneration harvest, planting, and thinning to maintain or enhance dense horizontal cover of conifers for snowshoe hare habitat. In aspen stands intermixed with spruce-fir forests, particularly in southern Idaho, southern Montana, Wyoming, and Utah, treatments should result in dense regeneration of aspen.	**VEG O1.** Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **VEG O2.** Maintain or improve lynx habitat, emphasizing high-quality winter snowshoe hare habitat near denning habitat. **VEG O4.** Design regeneration harvest, reforestation and thinning to develop characteristics suitable for winter snowshoe hare habitat.
Programmatic standards for all		
1. Conservation measures will generally apply only to the lynx habitat on federal lands with in LAUs.	**All Programs S1.** Management direction applies only to lynx habitat within LAUs, or, where specified for some measures, applies where needed to address connectivity between LAUs. Management direction only applies to management of federal lands. Note some management direction may require analysis beyond National Forest or BLM lands, however management constraints will only be applied to National Forest or BLM lands. LAU boundaries will not be adjusted except through agreement with the US Fish and Wildlife Service, based on new information on the presence or absence of lynx habitat within an LAU.	Objectives, standards and guidelines apply to the lynx habitat within LAUs as described in Features common to all alternatives.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
2. Lynx habitat will be mapped using criteria specific for each geographic area to identify appropriate vegetation and environmental conditions. Primary vegetation includes those types necessary to support lynx reproduction and survival. It is recognized that other vegetation types that are intermixed with the primary vegetation will be used by lynx, but are considered to contributed to lynx habitat only where associated with the primary vegetation. Refer to glossary and descriptions for each geographic area.	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*
3. To facilitate project planning, delineate LAUs. To allow for the assessment of potential effects of the project on an individual lynx, LAUs should be at least the size of area used by a resident lynx and contain sufficient year-round habitat.	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*
4. To be effective for the intended purposes of planning and monitoring, LAU boundaries will not be adjusted for individual projects, but must remain constant.	**All Programs S1.** Management direction applies only to lynx habitat within LAUs, or, where specified for some measures, applies where needed to address connectivity between LAUs. Management direction only applies to management of federal lands. Note some management direction may require analysis beyond National Forest or BLM lands, however management constraints will only be applied to National Forest or BLM lands. LAU boundaries will not be adjusted except through agreement with the US Fish and Wildlife Service, based on new information on the presence or absence of lynx habitat within an LAU.	**LAU S1.** LAU boundaries will not be adjusted except through agreement with the US Fish and Wildlife Service, based on new information about lynx habitat.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
5. Prepare a broad-scale assessment of landscape patterns that compares historical and current ecological processes and vegetative patterns, such as age-class distributions and patch size characteristics. In the absence of guidance developed from such an assessment, limit disturbance within each LAU as follows: if no more than 30 percent of lynx habitat within an LAU is currently in unsuitable condition, no further reduction of suitable conditions shall occur as a result of vegetation management activities by federal agencies.	**Vege S1.** Unless a broad scale assessment has been completed that substantiates different historical levels suitable habitat, limit disturbance within each LAU as follows: if more than 30 percent of lynx habitat within an LAU is currently in unsuitable condition, no further reduction of suitable conditions shall occur as a result of vegetation management activities on National Forest or BLM lands.	**VEG S1.** Unless a broad scale assessment has been completed that substantiates different historic levels of unsuitable habitat, limit disturbance in each LAU as follows: If more than 30 percent of the lynx habitat in an LAU is currently in unsuitable condition, no additional habitat may be made unsuitable because of vegetation management projects.
Programmatic guidelines for all		
1. The size of LAUs should generally be 6.500-10,000ha (16,000-25,000 acres or 25-50 square miles) in contiguous habitat, and likely should be larger in less contiguous, poorer quality, or naturally fragmented habitat. Larger units should be identified in the Southern Rocky Mountain Geographic Area. In the west it is recommended using watersheds, (e.g., 6th code hydrologic unit codes (HUCs) in more northerly portions of geographic areas, and 5th code HUCs in more southerly portions). Coordinate delineation of LAUs with adjacent administrative units and state wildlife management agencies, where appropriate.	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. See Appendix B.*
2. LAUs with only insignificant amounts of lynx habitat may be discarded, or lynx habitat within the unit incorporated into neighboring LAUs. Based on studies at the southern part of lynx range in the western U.S., it appears that at least 10 mi2 of primary vegetation should be presented within each LAU to support survival and reproduction. The distribution of habitat across the LAU should consider daily movement distances of resident females (typically up to 3-6 miles).	Not included. *Identification of LAUs completed see Appendix B*	Not included. *Identification of LAUs completed see Appendix B.*

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
3. After LAUs are identified, their spatial arrangement should be evaluated. Determine the number and arrangement of contiguous LAUs needed to maintain lynx habitat well distributed across the planning area.	Not included. *Identification of LAUs completed see Appendix B*	Not included. *Identification of LAUs completed see Appendix B.*
Project standards for all		
1. Within each LAU, map lynx habitat. Identify potential denning habitat and foraging habitat (primarily snowshoe hare habitat, and also habitat for important alternate prey such as red squirrels), and topographic features that may be important for lynx movement (major ridge systems, prominent saddles, and riparian corridors). Also identify non-forested vegetation (meadows, shrub-grassland communities, etc.) adjacent to and intermixed with forest lynx habitat that may provide habitat for alternate lynx prey species.	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. Identification of denning and forage habitat is implied in standards specific to those components.*	Not included. *Initial mapping based on broad scale data is completed and will be refined at the project level. Identification of denning and forage habitat is implied in standards specific to those components.*
2. Within an LAU, maintain denning habitat in patches generally larger than 5 acres, comprising at least 10 percent of lynx habitat. Where less than 10 percent denning habitat is currently present within an LAU, defer any management action that would delay development of denning habitat structure.	**Vege S2.** Within an LAU, maintain at least 10 percent of the LAU in lynx denning habitat. Denning habitat patches generally should be larger than 5 acres in size. Where less than 10 percent denning habitat is currently present within an LAU, defer vegetative management practices in stands that have the highest potential for developing denning habitat structure in the future. NOTE the intent is not to defer management actions where the denning habitat doesn't exist or won't exist in the near (20-30 yr future), but to defer in those stands that would provide denning in the near future (0-20 years).	**VEG S3.** Maintain at least ten percent of the lynx habitat in an LAU as denning habitat in patches generally larger than five acres. Where less than ten percent denning habitat is present in an LAU, defer vegetation management projects in stands that have the highest potential to develop denning-habitat.
3. Maintain habitat connectivity within and between LAUs.	**All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas. **ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
	Timber management	
Programmatic objectives for timber management		
1. Evaluate historical conditions and landscape patterns to determine historical vegetation mosaics across landscapes through time. For example, large infrequent disturbance events may have been more characteristic of lynx habitat than small frequent disturbances.	Not included. *Evaluation of landscape patterns is in implied in vegetation standards.*	Not included. *Evaluation of landscape patterns is in implied in vegetation standards.*
2. Maintain suitable acres and juxtaposition of lynx habitat through time. Design vegetation treatments to approximate historical landscape patterns and disturbance processes.	**Vege O1.** Maintain suitable acres and juxtaposition of lynx habitat through time, with an emphasis on continued availability of high quality foraging habitat in proximity to denning habitat. **Vege O3.** Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat.	**VEG O1.** Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **VEG O2.** Maintain or improve lynx habitat, emphasizing high-quality winter snowshoe hare habitat near denning habitat.
3. If the landscape has been fragmented by past management activities that reduced the quality of lynx habitat, adjust management practices to produce forest composition, structure and patterns more similar to those that would have occurred under historical disturbance regimes.	**Vege O3.** Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat.	**VEG O1.** Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.
Project objectives for timber management		
1. Design regeneration harvest, planting, and thinning to develop characteristics suitable for lynx and snowshoe hare habitat.	**Vege O5.** Design regeneration harvest, planting, and thinning to maintain or enhance dense horizontal cover of conifers for snowshoe hare habitat. In aspen stands intermixed with spruce-fir forests, particularly in southern Idaho, southern Montana, Wyoming, and Utah, treatments should result in dense regeneration of aspen.	**VEG O4.** Design regeneration harvest, reforestation and thinning to develop characteristics suitable for winter snowshoe hare habitat.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
2. Design projects to retain/enhance existing habitat condition for important alternative prey (particularly red squirrel).	**Vege O6.** Design vegetative management practices to develop characteristics suitable for lynx and snowshoe hare habitat while also considering the habitat needs of important alternate prey, especially red squirrels.	**VEG G5.** Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU. *Habitat needs for red squirrel would be evaluated under VEG O1.* **VEG O1.** Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.
Project standards for timber management		
1. Management actions (e.g., timber sales, salvage sales) shall not change more than 15 percent of lynx habitat within an LAU to unsuitable condition within a 10-year period	**Vege S3.** Vegetative management practices shall not change more than 15 percent of lynx habitat within an LAU to an unsuitable condition within a 10-year period.	**VEG S2.** Timber management projects shall not change more than 15 percent of lynx habitat on NFS or BLM lands in an LAU to an unsuitable condition in a ten-year period.
2. Following a disturbance such as blowdown, fires, insects/pathogens mortality that could contribute to lynx denning habitat, do not salvage harvest when the affected area is smaller than 5 acres. Exceptions to this include: 1) Areas such as developed campgrounds; 2) LAUs where denning habitat has been mapped and field validated (not simply modeled or estimated), and denning habitat comprises more than 10% of lynx habitat within an LAU; in these cases, salvage harvest may occur, provided that at least the minimum amount is maintained in a well-distributed pattern (see glossary).	**Vege S4.** In the event of a large wildfire, conduct a post-disturbance assessment before salvage harvest to evaluate potential for lynx denning and foraging habitat. **Vege S5.** Following a disturbance, such as blowdown, fires, insects/pathogens mortality that could contribute to lynx denning habitat, do not salvage harvest when the affected areas is smaller than 5 acres. Exceptions to this include (a) developed recreation sites or other areas of high human concentration; (b) in LAUs where denning habitat has been mapped and field validated, salvage harvest may occur, provided that a minimum of 10 percent of the area is retained and is well distributed within an LAU.	**VEG S4.** After a disturbance kills trees in areas five acres or smaller that could contribute to lynx denning habitat, salvage harvest may occur only: 1) In developed recreation sites, administrative sites, or authorized special use structures or improvements; or 2) In designated road or trail corridors where public safety or access has been or may be compromised; or 3) In LAUs where denning habitat has been mapped and field-validated, provided at least ten percent is retained and well distributed.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
3. In lynx habitat, pre-commercial thinning will be allowed only when stands no longer provide snowshoe hare habitat (e.g., self-pruning processes have eliminate snowshoe hare cover and forage availability during winter conditions with average snow pack).	**Vege S6.** In lynx habitat, pre-commercial thinning will be allowed only when stands no longer provide snowshoe hare habitat (e.g., self-pruning processes have eliminated snowshoe hare cover and forage availability during winter conditions with average snow pack).	**VEG S5**. Precommercial thinning projects that reduce winter snowshoe hare habitat during the stand initiation structural stage may occur only: 3) 1) Within 200 feet of administrative sites, dwellings or outbuildings. **VEG S6.** Precommercial thinning projects that reduce winter snowshoe hare habitat during the understory-reinitiation or old- multistory structural stages may occur only: 4) 1) Within 200 feet of administrative sites, dwellings or outbuildings.
4. In aspen stands within lynx habitat, in the Southern and Northern Rocky Mountains Geographic Area, apply harvest prescriptions that favor regeneration of aspen.	**Vege S7.** In aspen stands within lynx habitat, harvest prescriptions must favor regeneration of aspen. Note: An aspen stand is a group of aspen occupying a specific area and sufficiently uniform in composition, age, spatial arrangement, and conditions as to be distinguishable from the vegetation on adjoining lands.	**VEG O4.** Design regeneration harvest, reforestation and thinning to develop characteristics suitable for winter snowshoe hare habitat. **VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining. *Specific direction for aspen was not included because it is implied in VEG G1 and VEG O4. Regardless of what species is there, projects should be developed to provide winter snowshoe hare foraging habitat where it is lacking.*

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Project guidelines for timber management		
1. Plan regeneration harvest in lynx habitat where little or no habitat for snowshoe hares is currently available, to recruit a high density of confers, hardwoods and shrubs preferred by hares. Consider the following: Design regeneration prescriptions to mimic historical fire (or other natural disturbance) events, including retention of fire-killed dead trees and coarse woody debris; Design harvest units to mimic the pattern and scale of natural disturbances and retain natural connectivity across the landscape. Evaluate the potential of riparian zones, ridges, and saddles to provide connectivity; and Provide for continuing availability of foraging habitat in proximity to denning habitat.	**Vege G1.** Plan regeneration harvests in lynx habitat where little or no habitat for snowshoe hares is currently available, to recruit a high density of conifers, hardwoods and shrubs preferred by hares. Consider the following: 1) Design regeneration prescriptions to mimic historical fire (or other natural disturbance) events, including retention of fire-killed dead trees and coarse woody debris; 2) Design harvest units to mimic the pattern and scale of natural disturbances and retain natural connectivity across the landscape. Evaluate the potential of riparian zones, ridges, and saddles to provide connectivity; and 3) Provide for continuing availability of foraging habitat in proximity to denning habitat.	**VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining. **VEG G2.** Where more denning habitat is desired, leave standing trees and coarse woody debris in amounts similar to what would be there naturally. Denning habitat should be near winter snowshoe hare habitat. **ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity.
2. In areas where recruitment of additional denning habitat is desired, or to extend the production of snowshoe hare foraging habitat where forage quality and quantity is declining due to plant succession, consider improvement harvests (commercial thinning, selection, etc). Improvement harvests should be designed to: Retain and recruit understories of small diameter conifers and shrubs preferred by hares: Retain and recruit coarse woody debris, consistent with the likely availability of such material under natural disturbance regimes: and Maintain or improve juxtaposition of denning and foraging habitat	**Vege G2.** In areas where recruitment of additional denning habitat is desired, or to extend the production of snowshoe hare foraging habitat where forage quality and quantity is declining due to plant succession, consider improvement harvests (commercial thinning, selection, etc). Improvement harvests should be designed to: 1) Retain and recruit the understory of small diameter conifers and shrubs preferred by hares; 2) Retain and recruit coarse woody debris, consistent with the likely availability of such material under natural disturbance regimes; and 3) Maintain or improve the juxtaposition of denning and foraging habitat.	**VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining. **VEG G2.** Where more denning habitat is desired, leave standing trees and coarse woody debris in amounts similar to what would be there naturally. Denning habitat should be near winter snowshoe hare habitat. **VEG G3.** Vegetation management projects designed to retain or restore denning habitat

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
		should be located where there is a low probability of stand-replacing fire. *Placed forage and denning habitat direction into their own guidelines, instead of blending them together.*
	Wildland fire management	
Programmatic objectives for wildland fire management		
1. Restore fire as an ecological process. Evaluate whether fire suppression, forest type conversion, and other forest management practices have altered fire regimes and the function of ecosystems	**Vege O2.** Restore fire as an ecological process, and use fire as a tool to maintain or restore lynx habitat where appropriate.	**VEG O3.** Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.
2. Revise or develop fire management plans to integrate lynx habitat management objectives. Prepare plans for areas large enough to encompass large historical fire events.	Not included. *Forest Service Manual 5141.1 (June 1999) describes the requirements for considering fire use plans, in the forest planning process; therefore, it is already a requirement under existing policies.*	Not included. *Manual requirement FSM 5141.1*
3. Use fire to move toward landscape patterns consistent with native succession and disturbance regimes. Consider use of mechanical pre-treatment and management ignitions if needed to restore fire as an ecological process.	**Vege O2.** Restore fire as an ecological process, and use fire as a tool to maintain or restore lynx habitat, where appropriate.	**VEG O1.** Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **VEG O3.** Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.
4. Adjust management practices where needed to produce forest composition, structure, and patterns more similar to those that would have occurred under historical succession and disturbance regimes.	**Vege O3.** Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat.	**VEG O1.** Manage vegetation more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **VEG G3.** Vegetation management projects designed to retain or restore denning habitat should be located where there is a low probability of stand-replacing fire.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
5. Design vegetation and fire management activities to retain or restore denning habitat on landscapes with the highest probability of escaping stand-replacing fire events. Evaluate current distribution, amount, and arrangement of lynx habitat in relation to fire disturbance patterns.	**Vege O4.** Design vegetation and fire management activities to retain or restore denning habitat on landscape with the lowest probability of stand replacing fire events. **Vege O3.** Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat.	**VEG O1.** Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx. **VEG G3.** Vegetation management projects designed to retain or restore denning habitat should be located where there is a low probability of stand-replacing fire.
Project objectives for wildland fire management		
1. Use fire as a tool to maintain or restore lynx habitat.	**Vege O2.** Restore fire as an ecological process, and use fire as a tool to maintain or restore lynx habitat, where appropriate.	**VEG O3.** Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.
2. When managing wildland fire, minimize creation of permanent travel ways that could facilitate increased access by competitors.	**Vege O7.** When managing wildland fire, minimize creation of permanent travel ways that could facilitate increased access by competitors.	**VEG G4.** Fire use activities should not create permanent travel routes that facilitate snow-compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.
Project standards for wildland fire management		
1. In the event of a large wildfire, conduct a post-disturbance assessment before salvage harvest, particularly in stands that were formerly in late successional stages, to evaluate potential for lynx denning and foraging habitat. **2.** Design burn prescriptions to regenerate or create snowshoe hare habitat (e, g., regeneration of aspen and lodgepole pine).	**Vege S4.** In the event of a large wildfire, conduct a post-disturbance assessment before salvage harvest to evaluate potential for lynx denning and foraging habitat. **Vege S8.** Burn prescriptions in aspen and lodgepole pine stands will be designed to regenerate or create snowshoe hare habitat.	Not included. *If a project to salvage harvest in lynx habitat was proposed, then the NEPA document would describe the existing condition and effects on lynx habitat and standards VEG S1 through S4 would apply.* **VEG O3.** Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat. **VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Project guidelines for wildland fire management		
1. Design burn prescriptions to promote response by shrub and tree species that are favored by snowshoe hare.	Not included. *Already an objective Vege O6 and standard Vege S8.* **Vege O6.** Design vegetative management practices to develop characteristics suitable for lynx and snowshoe hare habitat while also considering the habitat needs of important alternate prey, especially red squirrels. **Vege S8.** Burn prescriptions in aspen and lodgepole pine stands will be designed to regenerate or create snowshoe hare habitat	**VEG G1.** Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available. Winter snowshoe hare habitat should be near denning habitat. Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining.
2. Design burn prescriptions to retain or encourage tree species composition and structure that will provide habitat for red squirrels or other alternate prey species.	Not included. *Already an objective Vege O6* **Vege O6.** Design vegetative management practices to develop characteristics suitable for lynx and snowshoe hare habitat while also considering the habitat needs of important alternate prey, especially red squirrels.	**VEG G5.** Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.
3. Consider the need for pre-treatment of fuels before conducting management ignitions. **4.** Avoid construction of permanent firebreaks on ridges or saddles in lynx habitat.	**Vege G3.** Consider the need for pre-treatment of fuels before conducting management ignitions. **Vege G4.** Avoid construction permanent firebreaks on ridges or saddles in lynx habitat.	Not included. *Standard procedures.* **VEG G4.** Fire use activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.
5. Minimize construction of temporary roads and machine fire lines to the extent possible during fire suppression activities.	Not included. *Already an objective – Vege 07* **Vege O7.** When managing wildland fire, minimize creation of permanent travel ways that could facilitate increased access by competitors.	**VEG G4.** Fire use activities should not create permanent travel routes that facilitate snow-compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.
6. Design burn prescriptions and, where feasible, conduct fire suppression action in a manner that maintains adequate lynx denning habitat (10% of lynx habitat per LAU).	**Vege G5.** Design burn prescriptions and, where feasible, conduct fire suppression action in a manner that maintains adequate lynx denning habitat (10% of lynx habitat per LAU).	**VEG S3.** Maintain at least ten percent of the lynx habitat in an LAU as denning habitat in patches generally larger than five acres. Where less than ten percent denning habitat is present in an LAU, defer vegetation management projects in stands that have the highest potential to develop denning-habitat.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
	Recreation management	
Programmatic objectives for recreation management **1.** Plan for and manage recreational activities to protect the integrity of lynx habitat, considering as a minimum the following: Minimize snow compaction in lynx habitat. Concentrate recreational activities within existing developed areas, rather than developing new recreational areas in lynx habitat On federal lands, ensure that development or expansion of developed recreation sites or ski areas and adjacent lands address landscape connectivity and lynx habitat needs.	**HUD O1.** Maintain the natural competitive advantage of lynx in deep snow conditions. Minimize snow compaction in lynx habitat. **HUD O2.** Concentrate activities within existing developed areas, rather than developing new areas in lynx habitat. **HUD O3.** On National Forest lands, ensure that development or expansion of developed recreation sites or ski areas and adjacent lands provides for landscape connectivity and lynx habitat needs.	**HU O1.** Maintain the lynx's natural competitive advantage over other predators in deep snow by discouraging the expansion of snow- compacting activities in lynx habitat. **HU O2.** Manage recreational activities to maintain lynx habitat and connectivity. **HU O3.** Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat. **HU O4.** Provide for lynx habitat needs and connectivity, when developing new or expanding existing developed recreation sites or ski areas.
Programmatic standards for recreation management **1.** On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and snowmobile play areas by LAU [1] *unless the designation serves to consolidate unregulated use and improves lynx habitat.* ~~This is intended to apply to dispersed recreation, rather than existing~~ NOTE: *This standard does not apply to* ski areas.	**Dispersed Rec S1.** On National Forest and BLM lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply to permitted ski areas, winter logging or trail re-routes necessary for public safety.	**HU S1.** Allow no net increase in groomed or designated over-the-snow routes or play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to other access regulated by HU S3.
2. Map and monitor the location and intensity of snow compacting activities (for example, snowmobiling, snow shoeing, cross-country skiing, dog sledding, etc.) that coincide with lynx habitat, to facilitate future evaluation of effects on lynx as information become available.	**Monitoring Item 1.** Map and monitor the location and intensity of snow compacting activities (for example, snowmobiling, snow shoeing, cross-country skiing, dog sledding, etc.) that coincide with lynx habitat, to facilitate future evaluation of effects on lynx as information become available.	**Monitoring.** Map the location and amount of snow-compacting use that coincided with lynx habitat in LAUs during the 1998-2000 season, for designated over-the-snow and groomed routes and areas, and routes of consistent snow compaction. Such activities include snowmobiling, snowshoeing, cross-country skiing, dog sledding, etc.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Programmatic guidelines for recreation management		
1. Provide a landscape with interconnected blocks of foraging habitat where snowmobile, cross-country skiing, snow-shoeing, or other snow compacting activities are minimized or discouraged.	**HUD O2.** Concentrate activities within existing developed areas, rather than developing new areas in lynx habitat. **Dispersed Rec S1.** On National Forest and BLM lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply to permitted ski areas, winter logging or trail re-routes necessary for public safety. *Incorporation of the objectives and standards should result in meeting this guideline; therefore it is not specifically included.*	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity. **HU S1.** Allow no net increase in groomed or designated over-the-snow routes or play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to other access regulated by HU S3. *Incorporating the objectives and standards should result in meeting this guideline; therefore, it is not specifically included.*
2. As information becomes available on the impacts of snow-compacting activities and disturbance on lynx; limit or discourage activities that result in snow compaction in areas where it is shown to compromise lynx habitat. Such actions should be undertaken on a priority basis considering habitat function and importance.	Not included. *It is an existing planning requirement under NEPA to review and utilize, as appropriate, any new information. New information may result in a need to amend existing management direction and special use permits.*	Not included. *It is an existing planning requirement to review and utilize, as appropriate, any new information. New information may result in a need to amend existing management direction.*
Project standards – Developed recreation		
1. In lynx habitat, ensure that federal actions do not degrade or compromise landscape connectivity when planning and operation new or expanded recreation developments.	**Dev Rec S2.** In lynx habitat, ensure that federal actions do not degrade or compromise landscape connectivity when planning and operation new or expanded recreation developments.	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity.
2. Design trails, roads, and lift termini to direct winter use away from diurnal security habitat.	**Developed Rec S1.** Design trails, roads, and lift termini to direct winter use away from diurnal security habitat. This standard only applies to developed ski areas.	**HU S2.** When developing or expanding ski areas, locate trails, access roads and lift termini to maintain and provide lynx diurnal security habitat if it's been identified as a need.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Project standards – Dispersed recreation		
1. To protect the integrity of lynx habitat, evaluate (as new information becomes available) and amend as needed, winter recreational special use permits (outside of permitted ski areas) that promote snow compacting activities in lynx habitat.	**Dispersed Rec S2.** To protect the integrity of lynx habitat, evaluate (as new information becomes available) and amend as needed, winter recreational special use permits (outside of permitted ski areas) that promote snow compacting activities in lynx habitat.	Not included. *It is an existing planning requirement to review and utilize, as appropriate, any new information. New information may result in a need to amend existing management direction and special use permits.*
Project guidelines – Developed recreation		
1. Identify and protect potential security habitats in around proposed developments or expansions.	**Developed Rec G1.** Identify and protect potential security habitats in around proposed developments or expansions	**HU S2**. When developing or expanding ski areas, locate trails, access roads and lift termini to maintain and provide lynx diurnal security habitat if it's been identified as a need. **HU G1.** When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat is maintained. **HU G3.** Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.
2. When designing ski area expansions, provide adequately sized coniferous inter-trail islands, including the retention of coarse woody material, to maintain snowshoe hare habitat.	**Developed Rec G2.** When designing ski area expansions, provide adequately sized coniferous inter-trail islands, including the retention of coarse woody material, to maintain snowshoe hare habitat.	**HU G1.** When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat is maintained.
3. Evaluate, and adjust as necessary, ski operations in expanded or newly developed areas to provide nocturnal foraging opportunities for lynx in a manner consistent with operational needs, especially in landscapes where lynx habitat occurs as narrow bands of coniferous forest across the mountain slopes.	**Developed Rec G3.** Evaluate, and adjust as necessary, ski operations in expanded or newly developed areas to provide nocturnal foraging opportunities for lynx in a manner consistent with operational needs, especially in landscapes where lynx habitat occurs as narrow bands of coniferous forest across the mountain slopes.	**HU G2.** When developing or expanding ski areas, nocturnal foraging opportunities should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
	Forest backcountry roads & trails	
Programmatic objectives for backcountry roads & trails		
1. Maintain the natural competitive advantage of lynx in deep snow conditions	**HUD O1.** Maintain the natural competitive advantage of lynx in deep snow conditions	**HU O1.** Maintain the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat.
Programmatic standards for backcountry roads & trails		
1. On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and snowmobile play areas by LAU[1] *unless the designation serves to consolidate unregulated use and improves lynx habitat.* Winter logging activity is not subject to this restriction.	**Dispersed Rec S1**. On National Forest and BLM lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply to permitted ski areas, winter logging or trail re-routes necessary for public safety.	**HU S1.** Allow no net increase in groomed or designated over-the-snow routes or play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to other access regulated by HU S3.
Programmatic guidelines for backcountry roads & trails		
1. Determine where high total road densities (greater than 2 miles per square mile) coincide with lynx habitat, and prioritize roads for seasonal restrictions or reclamation in those areas.	**Highway G7**. Determine where high total road densities (greater than 2 miles per square mile) coincide with lynx habitat, and prioritize roads for seasonal restrictions or reclamation in those areas.	Not included. *Now a requirement to evaluate the road system. 36 CFR 212.5(2) requires that the "Responsible Officials must review the road system on each National Forest and Grassland and identify the roads on lands under Forest Service jurisdiction that are no longer needed to meet resource objectives, and that, therefore should be decommissioned or considered for other uses, such as for trails".*
2. Minimize roadside brushing in order to provide snowshoe hare habitat.	**Highway G4**. Conduct roadside brushing on low-speed and low-volume roads at the minimum level necessary to provide for public safety.	**HU G8.** Cutting brush along low-speed, low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
3. Locate trails and roads away from forested stringers.	**Highway G5.** Locate trails and roads away from forested stringers.	**HU G7.** New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.
4. Limit public use on temporary roads constructed for timber sales. Design new roads, especially the entrance, for effective closure upon completion of sale activities.	**Highway G6.** New roads constructed for project specific activities in lynx habitat, such as timber sales and mineral exploration, should be closed to public use. Provide for the ability to implement an effective closure in the initial design of the road. Upon project completion reclaim or obliterate these roads if not needed for other management objectives.	**HU G9.** On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.
5. Minimize building of roads directly on ridge-tops or areas identified as important for lynx habitat connectivity.	**Highway G2.** Minimize building of roads directly on ridge-tops or areas identified as important for lynx habitat connectivity.	**HU G7.** New permanent roads should not be built on ridge-tops and saddles or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.
	Livestock grazing	
Programmatic objectives for livestock grazing		
1. In lynx habitat and adjacent shrub-steppe habitats, manage grazing to maintain the composition and structure of native plant communities.	**Grazing O2.** In lynx habitat and adjacent shrub-steppe habitats, manage grazing to maintain the composition and structure of native plant communities.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat. Specifics addressed in standard GRAZ S4 and LINK S2
Project objectives for livestock grazing		
1. Manage livestock grazing within riparian areas and willow carrs in lynx habitat to provide conditions for lynx and lynx prey.	**Grazing O1.** Within lynx habitat, manage livestock grazing in riparian areas and willow carrs to maintain and achieve mid seral or higher condition to provide cover and forage for lynx and prey species.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat. *Specifics addressed in standard GRAZ S3*

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
2. Maintain or move towards native composition and structure of herbaceous and shrub plant communities.	**Vege O3.** Design vegetation management practices, to the extent practicable, to be consistent with historical succession and disturbance regimes, while maintaining all required habitat components in lynx habitat.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat. *Specifics addressed in standard GRAZ S2, S3, S4*
3. Ensure that ungulate grazing does not impede the development of snowshoe hare habitat in natural or created openings within lynx habitat.	Not included. *Duplicates Grazing S1* **Grazing S1.** Do not allow livestock use in openings created by fire or timber harvest that would delay successful regeneration of the shrub and tree components.	**GRAZ O1.** Manage livestock grazing to be compatible with improving or maintaining lynx habitat. *Specifics addressed in standard GRAZ S1*
Project standards for livestock grazing		
1. Do not allow livestock use in openings created by fire or timber harvest that would delay successful regeneration of the shrub and tree components. [2] ~~Delay livestock use in post-fire and post-harvest created openings until successful regeneration of the shrub and tree components occurs.~~	**Grazing S1.** Do not allow livestock use in openings created by fire or timber harvest that would delay successful regeneration of the shrub and tree components.	**GRAZ S1.** In fire- and harvest-created openings, manage livestock grazing to ensure impacts do not prevent successful regeneration of shrubs and trees.
2. Manage grazing in aspen stands to ensure sprouting and sprout survival sufficient to perpetuate the long-term viability of the clones	**Grazing S2.** Manage grazing in aspen stands to ensure sprouting and sprout survival sufficient to perpetuate the long-term viability of the clones	**GRAZ S2.** In aspen stands, manage livestock grazing to contribute to their long-term health and sustainability.
3. Within the elevational ranges that encompass forested lynx habitat, shrub-steppe habitats should be considered as integral to the lynx habitat matrix and should be managed to maintain or achieve mid-seral or higher condition.	**Grazing S3.** Shrub-steppe habitats interspersed with or immediately adjacent to lynx habitat are integral to the lynx habitat and must be managed to maintain or achieve mid seral or higher condition.	**GRAZ S4.** In shrub-steppe habitats, manage livestock grazing in the elevation ranges of forested lynx habitat in LAUs, to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.
4. Within lynx habitat, mange livestock grazing in riparian areas and willow carrs to maintain or achieve mid-seral or later condition to provide cover and forage for lynx prey species.	**Grazing O1.** Within lynx habitat, manage livestock grazing in riparian areas and willow carrs to maintain and achieve mid seral or higher condition to provide cover and forage for lynx and prey species.	**GRAZ S3.** In riparian areas, and willow carrs, manage livestock grazing to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Other human developments: Oil & gas leasing, mines, reservoirs & agriculture		
Programmatic objectives for other human developments		
1. Design developments to minimize impacts on lynx habitat.	**HUD O4**. Manage human activities such as special uses, oil and gas leasing, mining and utility transmission corridors to minimize impacts to lynx and lynx habitat.	**HU O3**. Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat. **HU O5.** Manage human activities – such as exploring and developing minerals and oil and gas, placing utility corridors and permitting special uses – to reduce impacts on lynx and lynx habitat.
Programmatic guidelines for other human developments		
1. Map oil and gas production and transmission facilities, mining activities and facilities, dams, and agricultural lands on public lands and adjacent private lands, in order to address cumulative effects.	Not included. *Mapping is addressed through NEPA analysis requirements where applicable.*	Not included. *Mapping is addressed through NEPA analysis requirements*
Project standards for other human developments		
1. On projects where over-snow access is required, restrict use to designated routes.	**Other DevelopS1.** On projects where over-snow access is required, restrict use to designated routes.	**HU S3.** Winter access for non-recreation special uses and mineral and energy exploration and development, shall be limited to designated routes or designated over-the-snow routes.
Project guidelines for other human developments		
1. If activities are proposed in lynx habitat, develop stipulations for limitations on the timing of activities and surface use and occupancy at the leasing stage.	**Other human uses G1.** If activities are proposed in lynx habitat, develop stipulations for limitations on the timing of activities and surface use and occupancy at the leasing stage.	Not specifically included. *The objectives, standards, and guidelines would become part of plans. As such, the direction can be applied to projects at the permit to drill stage.*
2. Minimize snow compaction when authorizing and monitoring developments. Encourage remote monitoring of sites that are located in lynx habitat, so that they do not have to be visited daily.	**Other human uses G2.** Minimize snow compaction when authorizing and monitoring developments. Encourage remote monitoring of sites that are located in lynx habitat, so that they do not have to be visited daily.	**HU G4.** For mineral and energy development sites and facilities, remote monitoring should be encouraged to reduce snow compaction.
3. Develop a reclamation plan (e.g., road reclamation and vegetation rehabilitation) for abandoned well sites and closed mines to restore suitable habitat for lynx.	**Other human uses G3.** Develop a reclamation plan (e.g., road reclamation and vegetation rehabilitation) for abandoned well sites and closed mines to restore suitable habitat for lynx.	**HU G5.** For mineral and energy development sites and facilities that are closed, a reclamation plan that improves lynx habitat should be developed.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
4. Close newly constructed roads (built to access mines or leases) in lynx habitat to public access during project activities. Upon project completion, reclaim or obliterate these roads.	**Other human uses G4.** Close newly constructed roads (built to access mines or leases) in lynx habitat to public access during project activities. Upon project completion, reclaim or obliterate these roads.	**HU G9.** On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.
	MORTALITY RISK FACTORS	
Trapping		
Programmatic objectives for trapping		
1. Reduce incidental harm or capture of lynx during regulated and unregulated trapping activity, and ensure retention of an adequate prey base.	Not included	*Regulated by states therefore not addressed*
Programmatic guidelines for trapping		
1. Federal agencies should work cooperatively with States and Tribes to reduce incidental take of lynx related to trapping.	Not included	*Regulated by states therefore not addressed*
Predator control		
Programmatic objectives for predator control		
1. Reduce incidental harm or capture of lynx during predator control activities, and ensure retention of adequate prey base.	Not included	*Responsibility of APHIS, consultation underway or completed*
Programmatic standards for predator control		
1. Predator control activities, including trapping or poisoning on domestic livestock allotments on federal lands within lynx habitat, will be conducted by Wildlife Services personnel in accordance with FWS recommendations established through a formal Section 7 consultation process.	Not included	*Responsibility of APHIS, consultation underway or completed*
Shooting		
Programmatic objectives for shooting		
1. Reduce lynx mortalities related to mistaken identification or illegal shooting	Not included	*Regulated by states therefore not addressed*

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Programmatic guidelines for shooting		
1. Initiate interagency information and education efforts throughout the range of lynx in the contiguous states. Utilize trailhead posters, magazine articles, news releases, state hunting and trapping regulation booklets, etc., to inform the public of the possible presence of lynx, field identification, and their status.	Not included	*Regulated by states therefore not addressed*
2. Federal agencies should work cooperatively with States and Tribes to ensure that important lynx prey are conserved.	Not included	*Not plan direction. Working with states and tribes can occur without specific plan direction to do so.*
Competition & predation – Human activities as mortality risk factors		
Programmatic objectives for competition & predation		
1. Maintain the natural competitive advantage of lynx in deep snow conditions.	**HUD O1.** Maintain the natural competitive advantage of lynx in deep snow conditions.	**HU O1.** Maintain the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat.
Programmatic standards for competition & predation		
1. On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and snowmobile play areas by LAU. This is intended to apply to dispersed recreation, rather than existing ski areas.	**Dispersed Rec S1.** On federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and designated snowmobile play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply to permitted ski areas, winter logging or trail re-routes necessary for public safety.	**HU S1.** Allow no net increase in groomed or designated over-the-snow routes or play areas by LAU, unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to other access regulated by HU S3.
Highways		
Programmatic objectives for highways as mortality risk factors		
1. Reduce the potential for lynx mortality related to highways.	**HUD O5.** Reduce the potential for lynx mortality related to highways on National Forest lands.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas. **HU O6.** Reduce adverse highway effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity, and to reduce the potential for lynx mortality.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Programmatic standards for highways as mortality risk factors		
1. Within lynx habitat, identify key linkage areas and potential highway crossing areas	**Linkage S2.** Within lynx habitat, identify key linkage areas and potential highway crossing areas.	**LINK S1.** When highway or forest highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings. *Per the Conservation Agreement, linkage areas have been mapped – see Appendix B.*
Programmatic guidelines for highways as mortality risk factors		
1. Where needed, develop measures such as wildlife fencing and associated underpasses to reduce mortality risk.	**Highways and roads G3.** Where needed, develop measures such as wildlife fencing and associated underpasses to reduce mortality risk.	**ALL G1.** Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways or forest highways across federal land. Methods could include fencing, underpasses or overpasses.
	MOVEMENT & DISPERSAL RISK FACTORS	
Programmatic objectives for movement & dispersal		
1. Maintain and, where necessary and feasible, restore habitat connectivity across forested landscapes.	**All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.
Programmatic standards for movement & dispersal		
1. Identify key linkage areas that may be important in providing landscape connectivity within and between geographic areas, across all ownerships.	Not included. *Per the Conservation Agreement linkage areas have been mapped, see Appendix B.*	Not included. *Per the Conservation Agreement linkage areas have been mapped, see Appendix B.*
2. Develop and implement a plan to protect key linkage areas on federal lands from activities that would create barriers to movement. Barriers could result from an accumulation of incremental projects, as opposed to any one project.	Not specifically included. *The linkage objectives and standards identify ways to protect linkage areas.*	Not specifically included. *The linkage objectives and standards identify ways to protect linkage areas.*
3. Evaluate the potential importance of shrub-steppe habitats in providing landscape connectivity between blocks of lynx habitat. Livestock grazing within shrub-steppe habitats in such areas should be managed to maintain or achieve mid seral or higher condition, to maximize cover and prey availability. Such areas that are currently in late seral condition should not be degraded.	**Grazing O2.** In lynx habitat and adjacent shrub-steppe habitats, manage grazing to maintain the composition and structure of native plant communities	**LINK S2.** Manage livestock grazing in shrub-steppe habitats to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Programmatic guidelines for movement & dispersal		
1. Where feasible, maintain or enhance native plant communities and patterns, and habitat for potential lynx prey, within identified key linkage areas. Pursue opportunities for cooperative management with other landowners.	**All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs.	**LINK O1.** In areas of intermixed land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat. **ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.
Highways		
Programmatic objectives for highways as movement & dispersal risk factors		
1. Ensure that connectivity is maintained across highway rights-of-ways.	**HUD O6.** Ensure that connectivity is maintained across highway rights-of-way on National Forest and BLM lands.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.
Programmatic standards for highways as movement & dispersal risk factors		
1. Federal land management agencies will work cooperatively with the Federal Highway Administration and State Departments of Transportation to address the following with lynx geographic areas: Identify land corridors necessary to maintain connectivity of lynx habitat Map the location of "key linkage areas" where highway crossings may be needed to provide habitat connectivity and reduce mortality of lynx (and other wildlife).	**Linkage S2.** Within lynx habitat, identify key linkage areas and potential highway crossings. **Other Dev S2.** Identify, map and prioritize site-specific locations, using topographic and vegetation features, to determine where highway crossings are needed to reduce highway impacts on lynx.	**LINK O1.** In areas of intermixed land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat. **LINK S1.** When highway or forest highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings. **LINK G1.** National Forest System and BLM lands should be retained in public ownership. *Linkage areas mapped*

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Programmatic guidelines for highways as movement & dispersal risk factors		
1. Evaluate whether land ownership and management practices are compatible with maintaining lynx highway crossings in key linkage areas. On public lands, management practices will be compatible with providing habitat connectivity. On private lands, agencies will strive to work with landowners to develop conservation easements, exchanges, or other solutions.	**All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs. **Linkage O2.** Retain lands in key linkage areas in public ownership. **Linkage S2.** Within lynx habitat, identify key linkage areas and potential highway crossing areas. **Linkage S3.** Evaluate proposed land exchanges, land sales, and special use permits for effects on key linkage areas. *This guideline is covered under the objectives, standards and guidelines listed; therefore not directly included.*	**LINK O1.** In areas of intermixed land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat. **ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas. **ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity. **LINK G1.** National Forest System and BLM lands should be retained in public ownership. **ALL G1.** Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways or forest highways across federal land. Methods could include fencing, underpasses or overpasses. *This guideline is covered under the objectives, standards and guidelines listed; therefore, it's not directly included.*
Project standards for highways as movement & dispersal risk factors		
1. Identify, map, and prioritize site-specific locations, using topographic and vegetation features, to determine where highway crossings are needed to reduce highway impacts on lynx and other wildlife.	**Other Dev S2.** Identify, map, and prioritize site-specific locations, using topographic and vegetation features, to determine where highway crossings are needed to reduce highway impacts on lynx and other wildlife.	**LINK S1.** When highway or forest highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings. **ALL G1.** Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways or forest highways across federal land. Methods could include fencing, underpasses or overpasses.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
2. Within the range of lynx, complete a biological assessment of all proposed highway projects of federal lands. A land management agency biologist will review and coordinate with highway departments on development of the biological assessment.	Not included. *Already a requirement under FSM 2670*	Not included. *Already a requirement under FSM 2670*
Project guidelines for highways as movement & dispersal risk factors		
1. Dirt and gravel roads traversing lynx habitat (particularly those that could become highways) should not be paved or otherwise upgraded (e.g. straightening of curves, widening of roadway, etc.) in a manner that is likely to lead to significant increases in traffic volumes, traffic speeds, increased width of the cleared ROW, or would foreseeably contribute to development of increases in human activity in lynx habitat. Such projects may increase habitat fragmentation, create a barrier to movements, increase mortality risks due to vehicle collisions, and generate secondary adverse effects inducing, facilitating, or exacerbating development and human activity in lynx habitat. Whenever rural dirt and gravel roads traversing lynx habitat are proposed for such upgrades, a thorough analysis should be conducted on the potential direct and indirect effects to lynx and lynx habitat.	**Highway G1.** Dirt and gravel roads traversing lynx habitat (particularly those that could become highways) should not be paved or otherwise upgraded (e.g. straightening of curves, widening of roadway, etc.) in a manner that is likely to lead to significant increases in traffic volumes, traffic speeds, increased width of the cleared ROW, or would foreseeably contribute to development of increases in human activity in lynx habitat. Whenever rural dirt and gravel roads traversing lynx habitat are proposed for an upgrade a thorough analysis should be conducted on the potential direct and indirect effects on lynx and lynx habitat.	**HU G6.** Upgrading unpaved roads to maintenance levels 4 and 5 should be avoided in lynx habitat, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.
Land ownership as a movement & dispersal risk factor		
Programmatic objectives for land ownership		
1. Retain lands in key linkage areas in public ownership.	**Linkage O2.** Retain lands in key linkage areas in public ownership.	**LINK G1.** National Forest System and BLM lands should be retained in public ownership.
Programmatic standards for land ownership		
1. Identify key linkage areas by management jurisdiction(s) in management plans and prescriptions.	Not included. *Per the Conservation Agreement linkage areas have been mapped, see Appendix B.*	Not included. *Per the Conservation Agreement linkage areas have been mapped, see Appendix B.*

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Programmatic guidelines for land ownership		
1. In land adjustment programs, identify key linkage areas. Work toward unified management direction via habitat conservation plans, conservation easements or agreements, and land acquisition.	**Linkage O2.** Retain lands in key linkage areas in public ownership. **Linkage S2.** Within lynx habitat, identify key linkage areas and potential highway crossing areas. **Linkage S3.** Evaluate proposed land exchanges, land sales, and special use permits for effects on key linkage areas.	**LINK O1.** In areas of intermixed land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat. **LI NK G1.** National Forest System and BLM lands should be retained in public ownership. *Per the Conservation Agreement, linkage areas have been mapped – see Appendix B.*
Project standards for land ownership		
1. Develop and implement specific management prescriptions to protect/enhance key linkage areas.	Not specifically included. *The linkage objectives and standards identify ways to protect linkage areas.*	Not specifically included. *The linkage objectives and standards identify ways to protect linkage areas.*
2. Evaluate proposed land exchanges, land sales, and special use permits for effect on key linkage areas.	**Linkage S3.** Evaluate proposed land exchanges, land sales, and special use permits for effect on key linkage areas.	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity. **LINK G1.** National Forest System and BLM lands should be retained in public ownership. *An effects analysis on linkage areas is implied in the standard and guideline.*
Ski areas & large resorts as movement & dispersal risk factors		
Programmatic objectives for ski areas & large resorts		
1. When conducting landscape level planning of Federal lands, allocate land uses such that landscape connectivity is maintained.	**Linkage O1**. Within identified key linkage areas, provide for landscape connectivity. **All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs. **Linkage S1**. When planning new or expanding recreational developments, maintain connectivity within key linkage areas.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.

LCAS Recommendations	Scoping proposed action	DEIS Proposed Action, Alt B
Programmatic standards for ski areas & large resorts		
1. Within identified key linkage areas, provide for landscape connectivity.	**Linkage O1**. Within identified key linkage areas, provide for landscape connectivity. **All Programs S2.** Maintain, and where necessary and feasible restore habitat connectivity within and between LAUs. **Linkage S1.** When planning new or expanding recreational developments, maintain connectivity within key linkage areas.	**ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.
Project standards for ski areas & large resorts		
1. When planning new or expanding recreation developments, ensure that ~~key~~ *connectivity within* linkage areas are *maintained* ~~protected~~.[2]	**Linkage S1.** When planning new or expanding recreational developments, maintain connectivity within key linkage areas.	**ALL S1.** New or expanded permanent developments and vegetation management projects must maintain habitat connectivity.
Project guidelines for ski areas & large resorts		
1. Plan recreational development, and manage recreational and operational uses to provide for lynx movement and to maintain effectiveness of lynx habitat.	**Dev Rec G4.** Plan recreational development, and manage recreational and operational uses to provide for lynx movement and to maintain effectiveness of lynx habitat.	**HU G3.** Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.

[1] Changes to the LCAS were approved by the Lynx Steering Committee in a letter dated August 28, 2003. See Project Record, LCAS section

[2] Changes to the LCAS were approved by the Lynx Steering Committee in a meeting October 23-24, 2001. See Project Record, LCAS section

Appendix B – Lynx steering committee habitat and linkage area mapping process

INTERAGENCY LYNX AND WOLVERINE STEERING COMMITTEE CHARTER

I. BACKGROUND: In March, 1998, an interagency lynx coordination effort was initiated in response to the emerging awareness of the uncertain status of lynx populations and habitat in the conterminous United States. On July 8, 1998, the U.S. Fish and Wildlife Service (FWS) published a proposed rule to list the Canada lynx in the conterminous United States as a threatened species under the Endangered Species Act of 1973, as amended. On March 24, 2000, the FWS issued a final rule determining that the contiguous U.S. Distinct Population Segment (DPS) of the lynx is threatened. The Interagency Lynx Steering Committee (hereafter, the Committee) was formed in 1999 to provide interagency oversight and coordination of lynx conservation. At the October 26- 27, 2000 Committee meeting, it was decided that another carnivore species, wolverine, would be added to the Committee's oversight due to concern for wolverine population and habitat status.

II. ROLE: The Committee provides oversight and direction in the preparation and implementation of management strategies and recovery/conservation efforts for Forest Carnivores such as Canada Lynx and Wolverine. Through the Research Subcommittee (see Section IX, page 2), the Committee ensures coordination with the Rocky Mountain Research Station (RMRS) and the broader scientific community, as appropriate, in the preparation and implementation of research and administrative studies.

III. MEMBERSHIP: The membership includes Forest Service Wildlife Directors and Planning Directors from Regions 1, 2, 3, 4, 5, 6, and 9 and a Forest Supervisor, Bureau of Land Management; US Fish and Wildlife Service Regions 1, 3, 5, and 6; National Park Service and invitations for participation to state and wildlife agencies and Indian tribes.

IV. COMMITTEE CHAIR: The Committee Chair is the Deputy Regional Forester, Northern Region Forest Service.

V. ADVISOR(S)

Research Subcommittee
Science Teams
Biology Teams
Planning Teams
Communications Team

VI. INVITEES: The state wildlife agencies and Indian tribes within the historic range of Canada lynx and wolverine in the lower 48 states are invited to become members of the Committee.

VII. MEETINGS: Meetings are held every 6 months as agreed by the U.S. Forest Service and U.S. Fish and Wildlife Service in the "Canada Lynx Conservation Agreement" (February 7, 2000). Additional meetings are scheduled as necessary.
VIII. CONFERENCE CALLS: Conference calls shall be scheduled monthly or as needed.
IX. SUBCOMMITTEES (there is only one at this time)

A. RESEARCH SUBCOMMITTEE

Membership
Chair: Dr. Len Ruggiero, RMRS, Missoula, MT.
Dr. Kevin McKelvey, RMRS, Missoula, MT.
Dr. Kieth Aubry, Pacific Northwest Research Station, Portland, OR.
Dr. John Squires, RMRS, Missoula, MT.
US Geological Survey
Academia
State Wildlife Agency

Italicized agencies are memberships that were added at the Committee Meeting on April 30 – May 1, 2001. The Chair and existing subcommittee members are responsible for selecting the additional subcommittee members.

Subcommittee Responsibilities

1. Coordinate with land managers to identify and propose needed research programs to the Committee based upon conservation strategy and recovery plan elements.

2. Ensure that technically adequate study plans are in place for all Committee sponsored studies.

3. Establish ad hoc task forces to examine and report on special topics as requested by the Committee.

4. Review research findings and reports for scientific validity and make recommendations to the Committee on their adequacy or relevance for assisting management decisions. Circulate these reports for peer review when necessary.

X. OPERATIONS

A. RESOLUTION OF ISSUES

The Committee operates by consensus, whenever possible. Where the Committee cannot agree on a course of action or policy, the Committee Chair will make the decision. The Chair will take into consideration all points of view, and when appropriate, further consult with agency leaders prior to making the decision.

B. PROCEDURES TO AMEND CONSERVATION STRATEGIES

Purpose

Conservation strategies such as the Lynx Conservation Assessment and Strategy (LCAS) August, 2000 may be amended when research results or other relevant information indicate there is a valid, scientific documentation to improve conservation efforts by revising any aspect of the conservation strategy including the conservation program or management recommendations.

Process

1. The proponent of a proposal to amend a conservation strategy shall submit a written request for consideration to the Committee Chair. This proposal shall include all scientific evidence, reports, scientific publications or other documentation that support the proposed change. The Committee shall determine the best course of action and assign the review of the proposal to the appropriate teams.

2. The Research Subcommittee or Science Team shall facilitate the technical review and assess the scientific validity of the proposal. This review shall include a written recommendation regarding acceptance of the proposed modification. Allow a minimum of 60 days for this review.

3. The Biology Team shall review the proposal after receiving the Research Committee/Science team technical report and make a written recommendation to the Committee regarding acceptance of the proposed modification. Allow a minimum of 60 days for this review.

4. Forward the proposal and written recommendation(s) to the Committee for action.

5. When a proposed amendment to a conservation strategy is approved it shall receive a sequential number and be officially attached to the conservation strategy. The amendment shall specify which language in a conservation strategy is modified and the precise area of geographic application.

6. When a conservation strategy is amended, the Committee member agencies shall apply this new information in their operations as appropriate.

Definitions

Biology Team – Interagency wildlife biologists that apply scientific data and management principles to develop an assessment of risks to a particular species or group of species, thereby formulating the basis for management guidance that conserves species and habitats described in the conservation strategy. The team advises the Steering Committee on the merits of proposals to amend conservation and management strategies based upon scientific analysis provided by science teams or the Research Subcommittee.

Science Team – Scientists that review and interpret data to provide a scientific basis for management and conservation of species. The team advises the Steering Committee on the merits and scientific basis of proposals to amend conservation strategies.

Planning Team – Land and resource land management planning and resource specialists that advise the Steering Committee on strategies and approaches to amend or revise federal land and resource management plans to consider the new information in conservation strategies.

April, 2002

United States Department of Agriculture Forest Service

United States Department of Interior Bureau of Land Management

United States Department of Interior Fish and Wildlife Service

File Code: 2670 **Date:** August 22, 2000

Subject: Lynx Habitat Mapping Direction

To: Regional Foresters and Forest Supervisors (Regions 1, 2, 4, 6 & 9)

Bureau of Land Management State Offices and Districts (MT, OR, ID, WA, WY, UT & CO)

U.S. Fish and Wildlife Service (Regions 1, 3, 5 & 6)

Since implementation of the Lynx Conservation Assessment and Strategy (LCAS), questions have arisen from the field regarding mapping of lynx habitat. At the request of the Lynx Steering Committee, the Lynx Biology Team met on July 11-12, 2000, to respond to the questions. Several members of the Lynx Science Team and U.S. Fish and Wildlife Service consultation biologists from Idaho, Oregon, and Washington joined the Lynx Biology Team.

The Biology Team presented their recommendations to the Steering Committee on July 18; the recommendations were accepted, and the Steering Committee is providing the following direction to field units on mapping criteria and procedures (direction for mapping lynx habitat is enclosed). Please review your existing lynx habitat maps to ensure they are consistent with the following criteria:

1. Begin using the outer boundary as described in figures 8.20 (for the western U.S. – note: modifications have been made for the Blue Mountains and Southern Colorado areas), figure 8.22 (for the Great Lakes), and figure 8.23 (for the Northeast). These figures are found in Chapter 8, History and Distribution of Lynx in the Contiguous United States, in the Ecology and Conservation of Lynx in the United States. If you would like an electronic copy of the above maps, contact a Lynx Biology Team member from your Geographic Area.
2. In the western U.S., areas below 4,000 feet usually should be excluded.
3. Within the boundaries defined by Steps 1 and 2, map vegetation that can contribute to lynx habitat as described in the enclosure for each Geographic Area. These vegetation descriptions are being incorporated into the updated LCAS, which will be available and posted in August 2000.

4. Delineate Lynx Analysis Units (LAUs) around the habitat defined above.

Conservation Measures listed in the LCAS apply only within lynx habitat in the LAUs, except for those specific to connectivity.

Units involved in the national lynx monitoring effort should continue to participate until lynx presence or absence is established.

If you have questions about the mapping procedures, contact your agency's Lynx Biology Team representative.

/s/ KATHLEEN A. McALLISTER /s/ TERRY SEXSON (for) /s/ CHRIS JAUHOLA

KATHLEEN A. MCALLISTER
Deputy Regional Forester
Northern Region, FS
BLM

RALPH MORGENWECK
Region 6 Director, FWS

CHRIS JAUHOLA
Group Manager, Fish,
Wildlife, & Forests,

Enclosure

cc: Lynx Steering Committee, Biology Team, Science Team

To: Lynx Steering Committee

From: Lynx Biology Team

Date: 11/21/2003

Re: Recommendations - Lynx Habitat Mapping

At the Lynx Steering Committee conference call on May 23, 2000, several questions about habitat mapping were raised. The Lynx Biology Team met on July 11 and 12, 2000, to discuss and resolve these issues. Five members of the Science Team participated on July 11 in an advisory capacity, and three FWS consultation biologists from Washington, Oregon, and Idaho attended both days.

A set of mapping criteria and procedures was developed to guide and clarify the mapping process. The consequences of applying these criteria were also assessed.

Criteria and Procedures for Lynx Habitat Mapping

9) Information contained in the Science Team Report (Ruggiero et al. 2000a) provides the starting point for lynx habitat mapping. The outer boundary that should be used for each geographic area is shown in Chapter 8 (McKelvey et al. 2000): Figs 8.20 for western U.S., Fig. 8.22 for the Great Lakes, and Fig. 8.23 for the Northeast (these are combined into the insert map entitled "Vegetation Types and Elevation Zones Associated with Lynx Occurrences"), with the following exceptions.

In southern Colorado and northeastern Oregon and southeastern Washington, the Rocky Mountain Conifer Forest type as depicted in Fig. 8.19 should be added to the outer boundary. These areas were lost in the transition to Fig. 8.20 due to vagaries of the Kuchler delineations of vegetation subtypes, rather than lack of historical occurrences (K. McKelvey, pers. comm. 2000).

10) In the western U.S., lynx occurrences generally are found only above 4,000 ft. elevation (McKelvey et al. 2000). Areas below 4,000 ft. usually should be excluded. Note that elevation ranges are specified in the geographic area descriptions in the Lynx Conservation Assessment and Strategy.

11) Within the boundaries defined by the first two steps, map vegetation that could contribute to lynx habitat, as described for each geographic area in the Lynx Conservation Assessment and Strategy, using the finest-scale vegetation information that is available. The following clarifies primary and secondary vegetation for the western U.S.

    a) Mesic subalpine fir forests in the western U.S. are extensions of boreal forests. Subalpine fir habitat types dominated by cover types of spruce/fir, Douglas-fir, and seral lodgepole pine should be mapped as primary vegetation. These types must be present to support foraging, denning and rearing of young.

b) Other cool, moist habitat types (e.g., some Douglas-fir, grand fir) may contribute to lynx habitat where intermingled with and immediately adjacent to primary vegetation. These types are described as secondary vegetation.

c) Lynx do not appear to be associated with dry forest habitat types (e.g., ponderosa pine, dry Douglas-fir, and dry or climax lodgepole pine) except to move among mesic stands (Ruggiero et al. 2000b). These dry types should not be included as vegetation contributing to lynx habitat.

12) The next steps are to identify lynx habitat within a Lynx Analysis Unit (LAU), which involves consideration of several additional factors:

a) Determine whether the amount and spatial arrangement of vegetation is sufficient to warrant delineating a LAU (amount, patch size, inter-patch distance).

b) Evaluate land ownership pattern (to assess feasibility of achieving lynx conservation objectives on federally administered lands, to determine appropriate size and configuration of the LAU, etc.).

c) Review occurrence records of all types to assess validity of identifying the area as lynx habitat – location, pattern, consistency, year in relation to Canadian population cycles. Evaluate the records as described in Chapter 8 (McKelvey et al. 2000). Lack of records in an area does not necessarily indicate lack of habitat; conversely, detections do not necessarily indicate lynx habitat. Independently, occurrence records indicate only occurrence. Collectively, as a data set, occurrences can reveal habitats that likely are important to lynx.

Snow depth information may be useful to exclude ungulate winter ranges and areas that do not retain adequate snow cover during the winter.

Note: *Once identified as "lynx habitat," there is no longer a distinction between primary and secondary vegetation. Conservation measures of the Lynx Conservation Assessment and Strategy (LCAS) apply to lynx habitat.*

Consequences of Applying the Criteria

The lynx Biology Team reviewed methods used to date in each geographic area, to determine whether mapping was consistent with the above set of criteria. The team also indicated whether changes might be needed in LCAS Appendix A, "List of Administrative Units Involved in Conferencing/Consultation for Lynx."

Northeast and Great Lakes Geographic Areas

Mapping is believed to be consistent with these criteria and process. Two units (Green Mountain and Chequamegon-Nicolet National Forests) should be deleted from Appendix A (concurrence already received from FWS).

Southern Rockies Geographic Area

Mapping is believed to be consistent with these criteria and process (with the addition of the southern Colorado Kuchler type). No changes are needed in Appendix A.

Northern Rockies Geographic Area

Montana - Mapping is believed to be consistent with these criteria and process. No changes are needed for the list of units included in Appendix A.

Wyoming - Mapping is believed to be consistent with these criteria and process, although it was uncertain whether slope had been used to screen out areas (not supported by the Biology Team). The Biology Team was asked to review the Bighorns, and recommended that they continue to be included. Therefore no changes to Appendix A are anticipated.

Idaho - Mapping is believed to be consistent with these criteria and process, except that in central Idaho, moist Douglas-fir has been mapped as primary vegetation. In this region, Douglas-fir differs ecologically from other areas, occurring at higher elevations and on cooler sites, and provides high-quality snowshoe hare habitat. Mapping within the isolated mountain ranges of southeastern Idaho had been put on hold, and will be completed with consideration of the amount and spatial arrangement of vegetation. No changes to Appendix A are anticipated at this time.

Utah - Mapping is believed to be consistent with these criteria and process. Although there are comparatively few occurrence records in Utah, their distribution is very clumped, which suggests persistence of a local population. No changes to Appendix A are anticipated.

SE Washington and NE Oregon - Mapping is believed to be consistent (with the addition of the Rocky Mountain Conifer Kuchler type from Fig. 8.19). No changes to Appendix A are anticipated.

Cascade Mountains Geographic Area

Discussion centered on whether the Pacific silver fir and mountain hemlock Kuchler types should be considered as primary vegetation. Both the Rocky Mountain Conifer Forest (RMC) and Pacific Northwest Conifer Forest (PNC) are included in Fig. 8.19, while Fig. 8.20 narrows this down to the Douglas-fir and western spruce/fir subtypes of the RMC type, and the fir/hemlock subtype of the PNC type. Lynx are absent or uncommon in dense, wet forests along the Pacific coast (Aubry et al. 2000). In the western U.S., Rocky Mountain Conifer Forest contained 83% of all lynx records, but only 27% of the area, suggesting a strong association between lynx occurrences and this type. The Pacific Northwest Conifer had the second highest point frequency, but this represented only 7% of occurrences within about 7% of the area, indicating a weaker association. The Pacific Northwest Conifer type extends west of the Cascade Range to the coast and southward into northern California, although lynx occurrences were located only in areas adjacent to Rocky Mountain Conifer Forest. In addition, the snowshoe hare prey base appears to decline from north to south within the Cascades. There is little evidence to suggest that the silver fir/hemlock subtype actually supports lynx.

The historical occurrence record for Oregon is significantly smaller than for Washington. McKelvey et al. (2000) documented 134 verified occurrences (78 museum specimens) in Washington, compared with 12 verified occurrences in Oregon (9 museum specimens). There are a total of 765 records from Washington plus 200 trapping records, compared with a total of 72 records from Oregon. Unlike the clustering of occurrences seen in Washington and Utah, for example, which are suggestive of resident populations, lynx occurrences in Oregon are much more scattered and include several from anomalous habitats.

The Bio Team recommends the following for Washington and Oregon

13) Map vegetation using Fig. 8.20 as the outer boundary as described above.

14) Because of the uncertainty as to whether Pacific silver fir/mountain hemlock constitutes primary vegetation, do not identify these vegetation types as lynx habitat. Also, do not delineate LAUs or apply the LCAS west of the crest of the Cascades unless subalpine fir vegetation types occur in amounts and distribution great enough to establish an LAU. Lynx surveys and/or snowshoe hare information should continue to be collected through cooperative efforts of the Forest Service and the U.S. Fish and Wildlife Service.

15) On the east side of the Cascades, continue mapping with subalpine fir habitat types as primary vegetation. Identify lynx habitat and delineate LAUs using the process and criteria described above.

16) The results of the mapping will indicate whether any administrative units should be removed from Appendix A of the LCAS due to insufficient amounts or arrangement of lynx habitat.

References

Aubry, K. B., G. Koehler, and J. R. Squires. 2000. Ecology of Canada lynx in southern boreal forests. Pages 373-396 *In* Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. (Tech. Eds.) Ecology and conservation of lynx in the United States. Univ. Press of Colorado. Boulder, CO. 480 pp.

McKelvey, K.S., K. B. Aubry, and Y. K. Ortega. 2000. History and distribution of lynx in the contiguous United States. Pages 207-264 *In* Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. (Tech. Eds.) Ecology and conservation of lynx in the United States. Univ. Press of Colorado. Boulder, CO. 480 pp.

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Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 2000*b*. The scientific basis for lynx conservation: qualified insights. Pages 443-454 *In* Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. (Tech. Eds.) Ecology and Conservation of Lynx in the United States. Univ. Press of Colorado. Boulder, CO. 480 pp

United States Department of Agriculture **Forest Service** **Region One**

200 East Broadway
P.O. Box 7669
Missoula, MT 59807

File Code: 2670
Date: June 24, 2002

Dear :

Interagency/intergovernmental meetings were held recently to identify and recommend lynx linkage habitat locations within and adjacent to the states of Idaho, Montana, Utah and Wyoming. The identification of lynx linkage areas was a task identified in the *Canada Lynx Conservation Agreements* jointly signed by the Bureau of Land Management and the U.S. Forest Service and the U.S. Fish and Wildlife Service in August and February 2000, respectively. The U.S. Forest Service's Northern Regional Office Wildlife Staff in Missoula assisted in setting up and facilitating these meetings as well as digitizing the Draft map. The meetings were held in the following locations:

Missoula, MT - July 11, 2001
Boise, ID - November 28, 2001
Salt Lake City, Utah - April 17, 2002
Cody, WY - April 16, 2002
Cheyenne, WY - April 18, 2002

Participants included staff from the Bureau of Land Management, Fish and Wildlife Staff from the U. S. Forest Service's Northern Region Regional Office, U. S. Forest Service, State Fish and Wildlife Agencies, National Park Service, Native American Tribes, State and Federal Highway Departments, and the U. S. Fish and Wildlife Service.

The product of these meetings is a digitized map for your staff review. A map with lynx linkage areas identified for the state of Montana was sent out for review in February 2000 to state and federal agencies and Native American tribes in Montana for review. The current version of the map includes lynx linkage habitat in all four states. The linkage map is available on the following site

ftp://ftp.fs.fed.us/incoming/r1/ro/lynx_linkage.pdf

Additional instructions for viewing and/or printing the map are attached. If you do not have a plotter to print this map please contact Tim Bertram of the U.S. Forest Service Northern Regional Office at (406) 329-3611 and we will send you a hard copy of the map. I would appreciate any comments you may have by no later than **July 23, 2002**.

The revised definition of lynx linkage areas as approved by the Lynx and Wolverine Steering Committee (Oct 2001) is: **Areas that provide landscape connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas where blocks of lynx habitat are separated by intervening areas of non-lynx habitat such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between two blocks.**
Criteria that were considered in recommending lynx linkage areas are:

1) High density human developments (town sites, high density homes)
2) Linkages between blocks of lynx habitat including shrub/steppe habitats which link forested blocks of lynx habitat
3) Willow riparian habitat across valley bottoms
4) High percentage of public lands within the area
5) Known information concerning animal crossing locations

Other criteria that should be considered in relation to roads and highways are:

1) High traffic volume highways (may be two or four lane)
2) Presence of four lane highways
3) Highways which parallel railroad routes
4) Presence of numerous physical impediments (Jersey and Texas rail type barriers)
5) Where plans exist to upgrade or improve a highway (e.g. widening, barrier installation)
6) Expected or planned growth along or nearby existing road

The recommended linkage areas will be provided to the Lynx and Wolverine Steering Committee for review, concurrence and distribution for reference in land management and highway planning efforts, and for consideration in the Endangered Species Act Section 7 consultation process.

If you have any further questions regarding the mapping of lynx linkage areas please contact Tim Bertram (406-329-3611) at the U.S. Forest Service Northern Regional Office.

/s/ Kathleen A. McAllister

KATHLEEN A. MCALLISTER
LYNX/WOLVERINE STEERING COMMITTEE CHAIRPERSON AND
DEPUTY REGIONAL FORESTER

United States Department of Agriculture **Forest Service** **Region One** **200 East Broadway P.O. Box 7669 Missoula, MT 59807**

File Code: 2670 **Date:** November 13, 2003
Route To:

Subject: Lynx Linkage Areas

To: Marc Bosch, Forest Supervisors (1, 2, 4, 6, 9), Bureau of Land Management State Offices and Districts (CO, ID, MT, UT, WA, WY), U.S. Fish and Wildlife Service (Regions 1, 3, 5, 6), Directors of Fish & Wildlife Agencies: Montana, Idaho, Wyoming, Utah, Oregon, Washington, Colorado, Minnesota, Michigan, Wisconsin, New Hampshire and Vermont,

In the *Canada Lynx Conservation Agreements* signed by the U.S. Forest Service and the Bureau of Land Management with the U.S. Fish and Wildlife Service in February and August of 2000, respectively, the agencies agreed to identify lynx linkage areas. Lynx linkage areas are intended to maintain connectivity and allow for movement of animals between blocks of habitat that are otherwise separated by intervening non-habitat areas such as basins, valleys and agricultural lands, or where habitat naturally narrows due to topographic features. Interagency/intergovernmental meetings were held in the states of Idaho, Montana, Utah, Wyoming, and Colorado during 2001 and 2002 to identify and recommend the general locations of lynx linkage areas. Participants in these meetings included representatives from state wildlife agencies and state departments of forestry and transportation, and federal agencies including Federal Highway Administration, Bureau of Land Management, National Park Service, USDA Forest Service, tribal governments, private conservation groups, and others.

The U.S. Forest Service's Regional Offices in Missoula, MT, Ogden, UT, and Lakewood, CO assisted in setting up and facilitating these meetings, as well as digitizing the maps. Draft maps were sent out for review by affected agencies during June-July of 2002 for the Northern Rockies Geographic Area, and during October-November of 2002 for the Southern Rockies Geographic Area. The Lynx/Wolverine Steering Committee reviewed the maps at their October, 2002 meeting and gave their final approved at their November, 2003 meeting. The maps are now available for your consideration in land management and highway planning efforts, and in Endangered Species Act Section 7 consultations.

The maps are available on the U.S. Forest Service Forest Carnivore website:
http://www.fs.fed.us/r1/wildlife/carnivore/

The lynx linkage areas are coarsely mapped at a broad scale, and these maps should be considered a beginning point only. We expect to further refine their locations as more information becomes available, and as projects are proposed in these areas.

If you have any further questions, please contact Jim Claar (406-329-3664) or Tim Bertram (406-329-3611) in the Northern Regional Office in Missoula, or Nancy Warren (303-275-5064) in the Rocky Mountain Regional Office in Lakewood.

/s/ Kathleen A. McAllister
KATHLEEN A. MCALLISTER

Chairperson Lynx & Wolverine Steering
Committeei ″ Deputy Regional Forester

Appendix C — Acres of lynx habitat

Table C-1. Acres of lynx habitat by unit

	Unit size	Lynx habitat	Percent
NATIONAL FOREST			
Idaho			
Clearwater	1,825,397 acres	930,000 acres	51%
Idaho Panhandle	2,498,234 acres	1,170,000 acres	47%
Nez Perce	2,224,230 acres	810,000 acres	36%
Salmon-Challis	4,350,827 acres	1,800,000 acres	41%
Targhee	1,810,854 acres	1,050,000 acres	58%
Montana			
Beaverhead-Deerlodge	3,360,825 acres	2,060,000 acres	61%
Bitterroot	1,580,948 acres	640,000 acres	40%
Custer	1,187,621 acres	230,000 acres	19%
Flathead	2,355,592 acres	1,730,000 acres	73%
Gallatin	1,806,565 acres	870,000 acres	48%
Helena	975,387 acres	440,000 acres	45%
Kootenai	2,242,486 acres	1,010,000 acres	45%
Lewis and Clark	1,862,289 acres	970,000 acres	52%
Lolo	2,082,784 acres	1,110,000 acres	53%
Utah			
Ashley	1,384,136 acres	700,000 acres	51%
Wyoming			
Bighorn	1,107,671 acres	310,000 acres	28%
Bridger-Teton	3,437,527 acres	2,000,000 acres	58%
Shoshone	2,436,850 acres	640,000 acres	26%
BUREAU OF LAND MANAGEMENT			
Idaho			
Lower Snake River	5,333,000 acres	1,000 acres	0%
Upper Columbia	1,547,000 acres	90,000 acres	6%
Upper Snake River	5,418,000 acres	10,000 acres	0%
Utah			
BLM-Salt Lake	2,532,146 acres	0 acres	0%
TOTAL	53,360,369 acres	18,571,000 acres	35%

Unit size acres are from official government websites, at www.id.blm.gov and www.ut.blm.gov for the BLM, and www.fs.fed.us/land/staff/lar/ for the Forest Service.

Lynx habitat acres are estimates from computerized map modeling.

Appendix D – Schedule for revising plans

Table D-1. Schedule for revising NF plans in the Northern Rockies Geographic Area

	Year revision	Year revision complete or expected
NF Region 1		
Beaverhead-Deerlodge	2001	2005
Bitterroot	2003	2007
Clearwater	2003	2007
Custer	2004	2008
Flathead	2001	2005
Gallatin	2004	2008
Helena	2005	2009
Idaho Panhandle	2001	2005
Kootenai	1996	2005
Lewis & Clark	2005	2009
Lolo	2002	2006
Nez Perce	2003	2007
NF Region 2		
Bighorn	1999	2005
Shoshone	2004	2008
NF Region 4		
Ashley	2004	2008
Boise	*1998*	*2003*
Bridger-Teton	2005	2009
Caribou	*1999*	*2003*
Payette	*1998*	*2003*
Salmon-Challis	2005	2009
Sawtooth	*1999*	*2003*
Targhee	n/a	1997
Uinta	*1999*	*2003-completed*
Wasatch-Cache	*1999*	*2003-completed*
NF Region 6		
Colville	*2003*	*2007*
Malheur	*2004*	*2008*
Ochoco	*2006*	*2010*
Umatilla	*2004*	*2008*
Wallowa-Whitman	*2004*	*2008*

NFs in italics are not part of the Northern Rockies lynx amendment
From www.fs.fed.us/emc/nfma/LRMPrevisionschedule1002.pdf

Appendix E – Management area categories

Non-developmental = Categories 1-3

1. Natural, unmodified environments

In *natural, unmodified environments,* ecological processes such as fire, insects and disease operate relatively free from human intervention. Diversity resulting from natural succession and disturbance predominate and non-native vegetation is rare.

Users must be self-reliant and expect little contact with others. Few if any structural improvements exist; travel is usually non-motorized.

Natural, unmodified environments are usually Designated Wilderness, Wilderness Study Areas, Research Natural Areas, backcountry lands or rivers that are designated, suitable or eligible for classification as Wild Rivers.

2. Special natural areas

In *special natural areas,* representative or rare, narrowly distributed ecological settings or components are conserved, helping to make sure the pieces and functions are saved to provide for the overall sustainability of larger landscapes.

The influences of humans on the ecosystem are sometimes evident. Human uses vary but generally are non-intensive. Travel is generally non-motorized.

Some of these areas serve as a "natural" reference for areas that are heavily managed for particular objectives.

Special natural areas are often formally designated. They include some Research Natural Areas, most Areas of Critical Environmental Concern, many old growth reserves, rivers that are designated, suitable or eligible for classification as Scenic Rivers outside of Wilderness, and some other areas.

3. Essentially unmodified forested and grassland ecosystems

In *essentially unmodified forested and grassland ecosystems,* although characterized by natural appearing landscapes, an array of management tools may be used to restore or maintain ecological processes, resulting in some evidence of man's activities. Normally, natural processes and patterns predominate.

Ecological values are in balance with human occupancy, and consideration is given to both. Users may expect to experience some challenge and risk. Restrictions on motorized travel vary from area to area and season to season.

Essentially unmodified forested and grassland ecosystems include unsuitable forestlands that have no planned harvest, special-status species habitat areas, and areas designated for and occupied by wild horses or burros.

Developmental = Categories 4-8

4. Natural appearing, but modified for human use and occupancy

In areas that are *natural appearing, but modified for human use and occupancy,* ecological values are managed to provide recreational use, but maintained well within levels necessary to maintain

ecological systems. Resource use is not emphasized and has little impact.

Sights and sounds of humans can be expected. Motorized transportation is common.

Such lands include environmental education sites, rivers that are designated, suitable or eligible for classification as recreational, non-linear recreation sites and areas, and all other Areas of Critical Environmental Concern not included in special natural areas.

5. Modified forest ecosystems
Modified forest ecosystems are primarily forested ecosystems managed to meet a variety of needs. Ecologic conditions will be maintained with an emphasis on selected structures and compositions within the range of natural variability.

These lands often display high levels of forest management investment, use or activity, evidence of vegetative manipulation and many facilities.

Users expect to see other humans and the evidence of human activities. Motorized transportation is common.

6. Modified grassland
Modified grasslands are grasslands but include many woodland ecosystems, managed to meet a variety of needs. Ecologic objectives are likely to emphasize selected structures and compositions within the range of natural variability.

These lands often display high levels of forest management investment, use or activity, evidence of vegetative manipulation and many facilities. A wide variety of structure and composition is present.

Users expect to see other humans and the evidence of human activities. Motorized transportation is common.

7. Areas modified by human occupation and activities
In *areas modified by human occupation and activities*, public lands are intermingled with private lands to the point that public landowners cannot effectively manage for ecological values without the support and cooperation of the private sector.

Human activities have altered the natural appearances in most of these areas. The sight and sound of humans predominates. Private land use is often intensive agriculture, industrial or residential.

Resource use may not be planned on a sustainable basis but may occur in concert with surrounding private land values. Motorized transportation is common.

8. Modified non-sustainable areas
In *modified non-sustainable areas*, ecological conditions and processes likely are or have been permanently altered by humans beyond the point where natural appearing landscapes and ecological processes can be maintained. The areas are generally small; they may include mines or other concentrated uses.

Ecological values are protected where they affect the heath and welfare of humans. Human activities are generally commercial, directly or indirectly providing jobs and income. Motorized transportation is common.

Appendix F - Lynx research in the contiguous United States

Table F-1. Lynx research in the contiguous United States

Principal investigators	Focus	Location	Methods	Duration	Comments
		Completed			
S. Brainerd (1985, unpublished)	Demography & population dynamics Movements & dispersal	Northern Rocky Mtns. (western Montana)	Carcass examination & radio-telemetry	25 months	18 females w/mean litter size of 3.3 2 lynx monitored
D. Brittell, et al. (1989, unpublished) WDFW	Community interactions Demography & population dynamics Distribution & abundance Habitat relationships Movements & dispersal	Cascade Mountains (north-central Washington)	Radio-telemetry	34 months	23 lynx monitored
J. Brocke, et al (1991)	Human impacts	Northeast (New York)	Radio-telemetry	24 months	83 lynx translocated from the Yukon 16 road-killed
A. Fuller (1999, unpublished)	Stand- and sub-stand habitat relationships of snowshoe hare	Northeastern United States (North-central Maine)	Pellet counts, vegetation measurements	1997 - 1998	Compared density of snowshoe hare among mature, regenerating clear-cut, and partially harvested stands. Developed a model to predict density of hares based on within-stand habitat variables.

Principal investigators	Focus	Location	Methods	Duration	Comments
C. Hoving, D. Harrison U. of Maine, W. Krohn Maine Coop F&W Research Unit (unpublished 2001)	Distribution & abundance (historical & current) Habitat relationships (broad-scale & meso-scale) Habitat relationships of snowshoe hare	Northeastern U.S. and Maritime Canada (meso-scale analysis in NW Maine)	GIS modeling using museum & historical records, trapping data, and track surveys	1833 - 1999 for distribution 1987 - 1999 GIS models	Records of 1,150 lynx from 7 states and 3 provinces & predictive power of 94%, model driven by mean annual snowfall & deciduous forest. Lynx abundant in Maine before 1900. Select regenerating forest over mature forest in Maine. M. S. thesis; papers submitted to *Northeastern Naturalist* and *J. Applied Ecology*
G. Koehler (1990) WDFW	Demography & population dynamics Distribution & relative abundance Relationships with prey	Cascade Mountains (North-central Washington)	Radio-telemetry	25 months	7 lynx monitored
G. Koehler, et al (1979) WDFW	Community interactions Habitat relationships	Northern Rocky Mtns. (Western Montana)	Radio-telemetry	8 months	2 lynx; patterns of association with forest types
K. McKelvey, G. McDaniel (2001) USFS, RMRS	Habitat relationships of snowshoe hares	Northern Rocky Mtns. (Island park, Targhee NF, Idaho)	Pellet counts, capture/recapture, winter track counts	2000 - 2001	Sampled different forest types, stand ages and thinned & unthinned stands

Principal investigators	Focus	Location	Methods	Duration	Comments
K. McKelvey, et al. (2000) USFS, RMRS	Distribution & abundance Habitat relationships	Contiguous U.S.	Museum & historical records, trapping data, track surveys, questionnaire	n/a	3,865 occurrence records & historical distribution
K. McKelvey, et al. (2000) USFS, RMRS	Habitat relationships Human impacts	Cascade Mountains (North-central Washington)	Radio-telemetry	76 months	Reanalyzed data from two previous studies (Brittell et al. 1989, Koehler 1990), 1981-1988 22 lynx monitored No road avoidance (non-winter)
S. Mills, K. Pilgrim, M. Schwartz U. of Montana, K. McKelvey USFS, RMRS (2000)	Species identification of lynx based upon hairs.	Northern U.S.	MtDNA analysis of hair samples	1999 - 2001	Developed a thoroughly reliable, validated diagnostic test to distinguish among the felids of northern north America.
M. Schwartz & S. Mills U. of Montana, K. McKelvey, L. Ruggiero & F. Allendorf USFS, RMRS	Population dynamics	Alaska, western Canada, NW Montana	DNA analysis	1999 - 2001	Used micro satellite loci to estimate gene flow among lynx populations Implies persistence of lynx in contiguous U. S. depends upon dispersal from larger populations; connectivity between northern & southern populations important Paper published in *Nature* (2002)

Principal investigators	Focus	Location	Methods	Duration	Comments
J. Shaw & J. Long, (2001) Utah State U.	Habitat relationships of snowshoe hares	Northern Rocky Mtns. (N. Utah & S. Idaho - Ashley, Wasatch-Cache & Caribou-Targhee NFs)	Pellet counts & vegetative measurements	1999 - 2000	PhD dissertation compared snowshoe hare use in thinned and unthinnned lodgepole pine stands; Paper submitted to JWM for publication.
D. Smith (1984, unpublished)	Habitat relationships Movements & dispersal	Northern Rocky Mtns. (Western Montana)	Radio-telemetry	23 months	5 lynx monitored
Ongoing					
K. Aubry USFS, PNWRS, G. Koehler WDFW & J. von Kienast U. of Washington	Habitat relationships Relationships with prey & other predators Food habits	Cascade Mountains (North-central Washington)	Snow tracking and hair snagging	Dec 2000 - Mar 2001; Mar 2001 - Dec 2002	Investigate fine-scale habitat selection by lynx in a landscape composed of unharvested, recently harvested and recently burned forests.
R. Baty Montana DNRC, D. Ausband U. of Montana	Short term effects of precommercial thinning	Northern Rocky Mtns. (Stillwater State Forest, Montana)	Pellet counts & track surveys	2001 - 2003	Examine short-term effects on snowshoe hares from various harvest retention prescriptions.

Principal investigators	Focus	Location	Methods	Duration	Comments
K. Bunnell Brigham Young Univ.	Snow compaction effects on coyote distribution & feeding behavior Habitat relationships of snowshoe hares and red squirrels	Northern Rocky Mtns. (Ashely NF, UT) w/additional data collected in the Bear River Range (UT), Island Park (ID) & Bighorn Mts (WY)	Aerial snow tracking, radio telemetry, ground tracking, scat analysis Pellet counts (hares) and midden counts (red squirrels) to assess population densities to micro & macro habitat conditions	2002 – late 2003	Preliminary info confirms and quantifies the theory that compacted snow trails allow coyotes access to deep snow areas that are otherwise unavailable
S. Buskirk & J. Zahratka U. of Wyoming	Habitat relationships of snowshoe hares	Southern Rocky Mountains (Colorado - Rio Grande and Gunnison NFs)	Mark & re-observation	1 year beginning 2001 (hoping for additional extension)	Planning to study snowshoe hare survival & recruitment in future phase Some sampling procedures modeled similar to Scott Mills' study in Montana
A. Fuller & D. Harrison U. of Maine	Habitat relationships Prey relationships Spatial use & movement patterns	Northeastern United States (Northwestern Maine)	Snow tracking & vegetation measurements	Jan - Mar 2002 & 2003	Evaluate sub-stand scale habitat selection and develop a model to determine which habitat variables best predict habitat selection.
P. Griffin & S. Mills U. of Montana	Short-term effects of Precommercial thinning	Northern Rocky Mtns. (Seeley Lake, Montana)	Pellet counts, snow tracking, radio telemetry & trapping	1999 - 2002	Examine short-term precommercial thinning effects & 20% retention experiment on snow snowshoe hare abundance

Principal investigators	Focus	Location	Methods	Duration	Comments
J. Homyack, D. Harrison U. of Maine, W. Krohn USGS Maine Cooperative Fish and Wildlife Research Unit	Determine the stand-level effects of precommercial thinning (PCT) on snowshoe hares, 1-11 years post-treatment Determine the effects of PCT on small mammals, 1-16 years post-treatment Develop predictive relationship of hare density relation to overstory, understory & structural variables.	Northern Maine	Mark-recapture of small mammals and snowshoe hare, pellet counts, red squirrel call counts, intensive and extensive habitat measurements.	2000 - 2002	Sampled hare pellet density on 30 herbicide-treated clearcuts (17 treated with PCT, 13 control) Mark-recap of hares on subset of 8 stands Live-trap small mammals on 37 herbicide treated clearcuts (24 treated with PCT, 13 control)
C. McLaughlin Maine Dept. Inland Fisheries and Wildlife (MDIFW), J. Organ USFWS, G. Matula MDIFW, W. Jakubas MDIFW, C. Todd MDIFW	Determine lynx population viability Document mortality factors on lynx in NW Maine Identify habitats used by lynx in NW Maine, including relationships with snowshoe hare distribution and abundance Investigate relationships between lynx and sympatric predators in NW Maine Test efficacy of survey methods to detect lynx	Northeastern United States (Musquacook Lakes region, Northwestern Maine)	Radio-telemetry; vegetation surveys, pellet counts, winter track surveys, hair-pad surveys, camera surveys	1999 - 2003	42 lynx captured; 28 monitored (>2400 locations) 15 kittens handled in 8 litters 8 den sites described; Coyotes, fisher, red fox, bobcat monitored. Study is located on privately owned commercial forestland.

Principal investigators	Focus	Location	Methods	Duration	Comments
S. Mills & P. Griffin - U. of Montana	Snowshoe hare fecundity, mortality, survival and movements	Northern Rocky Mtns. (Seeley Lake, Montana)	Radio-telemetry, trapping, ultrasound	1998 - 2002	May continue beyond 2002 pending availability of funding.
S. Mills & P. Griffin U. of Montana	Model snowshoe hare population dynamics in a fragmented landscape	Northern Rocky Mtns. (Seeley Lake, Montana)	Utilizing data collected from study listed above (Mills & Griffin)	1998 - 2003	
S. Mills & K. Hodges U. of Montana	Habitat relationships of snowshoe hares Assess utility of pellet counts for estimating hare densities	Northern Rocky Mtns. (Lolo and Flathead NFs)	Mark & recapture, pellet counts & trapping	2000 - 2002	Study may be expanded, grants pending.
D. Murray U. of Idaho	Methods of population estimation	Northern Rocky Mtns. (Idaho Panhandle NFs)	Pellet counts	1999 - 2001	Estimate snowshoe hare densities among various vegetative stand conditions and elevation gradients
D. Murray U. of Idaho	Movements & survival of snowshoe hares Snowshoe hare foraging relationships	Northern Rocky Mtns. (Priest Lake RD, IPNF's)	Radio-telemetry	1999 - 2002	Compare natural foraging conditions to natural plus supplemental forage (pellets). Nutritional and feeding requirements also assessed with snowshoe hares in controlled pens
D. Murray U. of Idaho	Habitat relationships of snowshoe hares	Northern Rocky Mtns. (Idaho Panhandle NFs)	Pellet counts	2000 - 2005	Compare responses of snowshoe hares to different thinning prescriptions May run up to 10 years

Principal investigators	Focus	Location	Methods	Duration	Comments
T. Shenk CDOW	Movements & dispersal Mortality assessments Prey relationships	Southern Rocky Mountains (Colorado)	Radio-telemetry & snow tracking	Began in 1999 & is ongoing	Focused on lynx reintroduced from Alaska & Canada
K. Shick & J. Goodburn U. of Montana	Habitat relationships of snowshoe hares	Northern Rocky Mtns. (Flathead NF, Montana)	Pellet counts, vegetative sampling	2001	Investigate snowshoe hare densities stands of varying structural and phase categories M.S. thesis
J. Squires USFS, RMRS	Human impacts (snow compacting activities) Interspecific predator relationships	Northern Rocky Mtns. (Northwestern Montana)	Radio-telemetry	2001 - 2003	Investigate relationship of coyotes and lynx in relation to snow compacting activities May continue until 2004.
J. Squires USFS, RMRS & others	Habitat use & movements Prey relationships	Northern Rocky Mtns. (Pioneer Mtns. & other areas, Beaverhead-Deerlodge NFs)	Radio-telemetry, snow tracking	2000 - 2003	No lynx detected or trapped to date. Potential prey species w/in area documented. Also gathering information on wolverine occurrence
J. Squires USFS, RMRS, T. Laurion WG&F	Demography & population dynamics Community interactions Habitat relationships Movements & dispersal Relationships with prey	Northern Rocky Mtns. (Western Montana & Western Wyoming)	Radio-telemetry	Montana began in 1998 & is ongoing; Wyoming began in 1996 & is ongoing	Montana - 18 lynx radioed (1998) Wyoming - 2 lynx radioed (1996-97)

Principal investigators	Focus	Location	Methods	Duration	Comments
M. Schwartz, J. Kolbe, K. McKelvey, L. Ruggiero, J. Squires USFS -RMRS J. Copeland IDFG	Habitat relationships Highway crossings Human impacts (snowmobiles/winter recreation) Interspecific predator competition Movements & dispersal Relationships with prey	Northern Rocky Mtns. (Clearwater NF, Idaho; Lolo NF, Montana)	Radio-telemetry, snow tracking, highway mortality assessments	2001 - 2006	Includes gathering information on wolverines and other carnivores
J. Weaver	Habitat relationships of snowshoe hares	Northern Rocky Mtns. (Kootenai NF, Montana)	Pellet counts	1996 - 2006	Evaluate abundance & trends of snowshoe hares in a range of stand types & structures & evaluate snowshoe hare abundance & trends in control & paired precommercially thinned stands under a variety of PCT prescriptions.

Appendix G – Precommercial thinning examples for Alternative D

1. Planted white pine

Daylight thinning may be allowed in planted rust-resistant white pine if 80 percent of the snowshoe hare forage is retained. The maximum reduction in snowshoe hare forage and cover would be 20 percent. Allow local variations in spacing, depending on levels of rust-resistance and white pine stocking.

Researchers suggest the clearing radius be at least four feet and suggest the optimum competitive advantage is gained at ten feet. To keep the reduction in hare forage under 20 percent, a four-foot radius would allow daylight thinning around a maximum of 173 trees per acre; a 10-foot radius would protect at most 28 trees per acre. The trees selected to daylight would be the best performing planted, rust-resistant white pine. No thinning would be allowed outside specified clearing limits.

2. Promoting larch or ponderosa pine for large trees

Daylight thinning may be allowed to release larch or ponderosa pine to promote large trees that can survive fire in the future and be available to re-seed future stands. The maximum reduction in snowshoe hare forage and cover would be 20 percent.

The number of trees selected for daylight thinning would vary, depending on local fire history, desired snag levels and management objectives. For example, to stay within the 20 percent loss limit, a clearing radius of 12 feet would result in protecting a maximum of 20 trees per acre. A clearing radius of 15 feet would protect at most 12 trees per acre. No thinning would be permitted outside the clearing limits.

3. Promoting lodgepole pine for old growth

Where the choice has been made to manage lodgepole pine to develop old growth characteristics, thinning would be allowed. One approach is found in John Shaw's dissertation, "Silvicultural Systems for Maintenance of Structure in a Forest Landscape" (Shaw 2002).

4. Where forage exceeds the range of historic conditions

Thinning may be allowed when a broadscale assessment has determined that forage conditions exceed the range of historic conditions. Generally, this is when current conditions exceed historic, or when a disturbance occurs over a large area and one similar condition is created. For example, if a 50,000-acre fire burns within an LAU or LAUs, precommercial thinning would be allowed in part, but not all, of the burned area, to create diversity.

Appendix H – TEPS animals

Table H-1. How amendment would affect Threatened, endangered, proposed or sensitive animals* whose habitat overlaps lynx habitat

	Montana NFs										Idaho NFs					Utah NF	Wyoming NFs			Idaho BLM				Utah BLM
	Beaverhead -	Deerlodge	Bitterroot	Custer	Flathead	Gallatin	Helena	Kootenai	Lewis & Clark	Lolo	Clearwater	Idaho Panhandle	Nez Perce	Salmon-Challis	Targhee	Ashley	Bridger-Teton	Bighorn	Shoshone	Lower Snake River	Upper Snake River	Upper Columbia		Salt Lake
Endangered																								
Mammals																								
Gray wolf	+/-				+/-		+/-	+/-	+/-	+/-		+/-												
Woodland caribou												+/-												
Birds																								
Southwestern willow flycatcher																0			0					
Fish																								
Bonytail chub																+/-	+/-							
Colorado Squawfish																+/-	+/-							
Humpback chub																+/-	+/-							
Kendall Warm Springs dace																+/-	+/-							
Razorback sucker																+/-	+/-							
Sockeye salmon														+/-										
White sturgeon								+/-				+/-												
Threatened																								
Mammals																								
Canada lynx	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+		+
Gray wolf (00j rule)	+/-	+/-	+/-		+/-					+/-	+/-	+/-	+/-	+/-	+/-		+/-		+/-					
Grizzly bear	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-		+/-	+/-	+/-	+/-	+/-		+/-		+/-					
Birds																								
Bald eagle	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0		0			
Mexican spotted owl																+/-								

	Montana NFs										Idaho NFs					Utah NF	Wyoming NFs			Idaho BLM			Utah BLM
	Beaverhead - Deerlodge	Bitterroot	Custer	Flathead	Gallatin	Helena	Kootenai	Lewis & Clark	Lolo	Clearwater	Idaho Panhandle	Nez Perce	Salmon-Challis	Targhee	Ashley	Bridger-Teton	Bighorn	Shoshone	Lower Snake River	Upper Snake River	Upper Columbia	Salt Lake
(Threatened, continued)																						
Fish																						
Bull trout	+/-	+/-		+/-		+/-	+/-		+/-	+/-	+/-	+/-	+/-							+/-		
Chinook salmon		+/-								+/-		+/-	+/-				+/-	+/-				
Steelhead trout		+/-								+/-		+/-	+/-									
Proposed																						
Birds																						
Mountain plover						0		0							0			0				
Sensitive																						
Mammals																						
Bighorn sheep													0			0						
California bighorn sheep	0	0	0	0	0	0	0	0	0	0	0	0										
Dwarf shrew																	+	+				
Fisher	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-		+/-		+/-		+/-	+/-	
Marten	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-					+/-	+/-				
Northern bog lemming	0	0	0	0	0	0	0	0	0	0	0	0										
Spotted bat															0							
Townsend's big-eared bat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Water vole	0	0	0	0	0	0	0	0	0	0	0	0					0	0				
Wolverine	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+		+		
Birds																						
Baird's sparrow	0	0	0	0	0	0	0	0	0	0	0	0					0	0				
Black-backed woodpecker	+	+	+	+	+	+	+	+	+	+	+	+						+		+	+	
Boreal owl	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-				+/-	
Common loon	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0				
Flammulated owl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0		
Fox sparrow																	0	0				

	Montana NFs										Idaho NFs					Utah NF	Wyoming NFs			Idaho BLM				Utah BLM
	Beaverhead -	Deerlodge	Bitterroot	Custer	Flathead	Gallatin	Helena	Kootenai	Lewis & Clark	Lolo	Clearwater	Idaho Panhandle	Nez Perce	Salmon-Challis	Targhee	Ashley	Bridger-Teton	Bighorn	Shoshone	Lower Snake River	Upper Snake River	Upper Columbia		Salt Lake
(Sensitive, continued)																								
Golden-crowned kinglet	-		-	-	-	-	-	-	-	-	-	-	-					-	-					
Golden eagle	0		0	0	0	0	0	0	0	0	0	0	0											
Great gray owl	+/-		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-					+/-		
Hammond's flycatcher																					-	-		
Harlequin duck	0		0	0	0	0	0	0	0	0	0	0	0											
Loggerhead shrike	0		0	0	0	0	0	0	0	0	0	0	0					0	0					
Merlin	+/-		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-					+/-	+/-					
Mountain plover							0		0															
Mountain quail	0		0	0	0	0	0	0	0	0	0	0	0											
Northern goshawk	+/-		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-			+/-		
Olive-sided flycatcher																					+/-	+/-		
Peregrine falcon	0				0				0			0		0	0	0	0		0					
Pygmy nuthatch																		0	0					
Red-naped sapsucker																					+			
Swainson's thrush																					+/-			
Three-toed woodpecker														+	+	+	+	+	+			+		
Trumpter swan																0								
Williamson's sapsucker																					+			
White-headed woodpecker	+		+	+	+	+	+	+	+	+	+	+	+								+			
Fish																								
Artic grayling	+/-		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-											
Colorado River cutthroat trout																	+/-							
Inland redband trout	+/-		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-											
Ling	+/-		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-												
Sicklefin chub	+/-		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-											

	Montana NFs									Idaho NFs					Utah NF	Wyoming NFs			Idaho BLM			Utah BLM
	Beaverhead - Deerlodge	Bitterroot	Custer	Flathead	Gallatin	Helena	Kootenai	Lewis & Clark	Lolo	Clearwater	Idaho Panhandle	Nez Perce	Salmon-Challis	Targhee	Ashley	Bridger-Teton	Bighorn	Shoshone	Lower Snake River	Upper Snake River	Upper Columbia	Salt Lake
(Sensitive, continued)																						
Snake River cutthroat trout														+/-		+/-						
Sturgeon chub	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-										
Torrent sculpin	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-										
West slope cutthroat trout	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-									
Yellowstone cutthroat trout	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-		+/-			+/-	+/-				
Amphibians & reptiles																						
Boreal toad	+	+	+	+	+	+	+	+	+	+	+	+						+				
Coeur d'Alene salamander	0	0	0	0	0	0	0	0	0	0	0	0										
Northern leopard frog	+	+	+	+	+	+	+	+	+	+	+	+						+	+			
Spotted frog													0	0		0	0	0				
Wood frog																	0					
Invertebrates																						
Regal frittilary	0	0	0	0	0	0	0	0	0	0	0	0										
Tawny crescent butterfly	0	0	0	0	0	0	0	0	0	0	0	0										

*Species documented or suspected to be present in lynx habitat

0	=	Species not affected by the alternatives
-	=	Adverse (negative) effects possible from implementing Alternatives B, C, D or E
+	=	Beneficial (positive) effects possible from implementing Alternatives B, C, D or E
+/-	=	Either adverse or beneficial effects from implementing Alternatives B, C, D or E

Sources for evaluating habitat effects include:

Brainerd 1985
Brocke et al. 1991
Ehrlich et al. 1988
Johnsgard 1990
Martin et al. 1951
NaturServe Explorer, Version 1.6 2002
Nussbaum et al. 1983
Schmidt & Gilbert 1978
Sibley 2000
Smith 1984
USDA FS 1999c
USDA FS 1999d
Whitaker 1996
Zielnski & Cucera 1995

Appendix I – MIS species*

Table I-1. How amendment would affect management indicator species whose habitat overlaps lynx habitat

	Montana NFs									Idaho NFs					Utah NF	Wyoming NFs		
	Beaverhead-Deerlodge	Bitterroot	Custer	Flathead	Gallatin	Helena	Kootenai	Lewis & Clark	Lolo	Clearwater	Idaho Panhandle	Oez Perce	Salmon-Challis	Targhee	Ashley	Bridger-Teton	Bighorn	Shoshone
Mammals																		
Beaver								+										
California bighorn sheep													0			0		0
Bighorn sheep			0		0	0												
Black bear								+/-										
Bobcat								+										
Canada lynx								+/-										
Elk	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-
Fisher								+/-				+/-		+/-		+/-		
Gray wolf	+/-		+/-	+/-			+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-				+/-
Grizzly bear	+/-		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-				+/-
Marten	+/-	+/-		+/-		+/-				+/-	+/-	+/-	+/-	+/-		+/-		
Montane vole	0																	
Moose	+									+	+	+				+		+
Mountain goat	0						0	0					0					0
Mountain lion								0										
Mule deer	+/-			+/-		+/-		+/-					+/-		+/-	+/-		+/-
Red squirrel													+/-	+/-			+/-	
Townsend's big-eared bat														0				
Water shrew	0																	
Western jumping mouse	0																	
White-tailed deer			+/-	+/-			+/-	+/-		+/-	+/-							
Wolverine								+/-						+/-				
Woodland caribou											+/-							

	Montana NFs									Idaho NFs					Utah NF	Wyoming NFs		
	Beaverhead-Deerlodge	Bitterroot	Custer	Flathead	Gallatin	Helena	Kootenai	Lewis & Clark	Lolo	Clearwater	Idaho Panhandle	0ez Perce	Salmon-Challis	Targhee	Ashley	Bridger-Teton	Bighorn	Shoshone
Birds																		
Bald eagle	0		0	0	0	0	0	0	0	0	0	0	0	0				0
Belted kingfisher	0									0								
Black-backed woodpecker														+				
Blue grouse	+							+										+
Boreal owl														+/-	+/-	+/-		
Brewer's sparrow			0													0		0
Common loon														0		0		
Downy woodpecker														+				
Flammulated owl														0	0	0		
Golden eagle								0							0			
Great gray owl													+/-	+/-		+/-		
Hairy woodpecker	+					+								+				+
Harlequin duck														0		0		
Lark sparrow																	0	
Lincoln's sparrow															0			
Mountain bluebird													+					
Northern goshawk	+/-		+/-		+/-	+/-		+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-		+/-
Northern flicker														+				
Northern oriole			0															
Ovenbird			0															
Peregrine falcon	0		0	0			0	0	0	0		0	0					0
Pileated woodpecker	+/-	+/-		+/-		+/-	+/-		+/-	+/-	+/-	+/-	+/-					
Prairie falcon								0										
Pygmy nuthatch													0					
Red-breasted nuthatch																	+	
Red-napped sapsucker														+	+			
Ruby-crowned kinglet													+					
Ruffed grouse			0												0			0
Three-toed woodpecker	+							+						+	+	+	+	

Appendix I

	Montana NFs									Idaho NFs					Utah NF	Wyoming NFs		
	Beaverhead-Deerlodge	Bitterroot	Custer	Flathead	Gallatin	Helena	Kootenai	Lewis & Clark	Lolo	Clearwater	Idaho Panhandle	Oez Perce	Salmon-Challis	Targhee	Ashley	Bridger-Teton	Bighorn	Shoshone
(Birds, continued)																		
Rufous-sided towhee			0															
Sage grouse															0			
Trumpeter swan														0		0		
Vesper sparrow													0					
Warbling vireo															0			
White-crowned sparrow															0			
White-tailed ptarmigan															0			
Williamson's sapsucker														+				
Willow flycatcher	+																	
Yellow-belied sapsucker													+					
Yellow warbler			+										+					
Fish																		
Artic grayling	+/-																	
Bonneville cutthroat trout																+/-		
Brook trout								+/-										
Bull trout				+/-									+/-					
Chinook salmon										+/-		+/-	+/-					
Colorado River cutthroat trout																+/-		
Cutthroat trout	+/-	+/-	+/-	+/-		+/-		+/-			+/-	+/-	+/-		+/-			
Largemouth bass			+/-															
Rainbow trout								+/-			+/-		+/-			+/-		
Sculpin																+/-		
Snake River cutthroat trout														+/-		+/-		
Steelhead trout										+/-		+/-	+/-					
Trout					+/-		+/-											+/-
Westslope cutthroat trout										+/-								
Yellowstone cutthroat trout																		
Amphibians & reptiles																		
Spotted frog														0		0		
Invertebrates																		
Macro-invertebrates													+/-					

*The FS uses management indicator species; the BLM does not.
Species listed in *italics* are also listed as threatened, endangered, proposed or sensitive species

0 = Species not affected by the alternatives
- = Habitat likely reduced (negative) by implementing Alternatives B, C, D or E
+ = Habitat likely improved (positive) by implementing Alternatives B, C, D or E
+/- = Some habitat reduced, some improved by implementing Alternatives B, C, D or E

Sources for evaluating habitat effects include:

Brainerd 1985
Brocke et al. 1991
Ehrlich et al. 1988
Johnsgard 1990
Martin et al. 1951
NaturServe Explorer, Version 1.6 2002
Nussbaum et al. 1983
Schmidt & Gilbert 1978
Sibley 2000
Smith 1984
USDA FS 1999c
USDA FS 1999d
Whitaker 1996
Zielnski & Cucera 1995

Appendix J – TEPS Plants

Table J-1. Threatened, Endangered, Proposed or Sensitive plants* found in the amendment area

Scientific name	Common name	Idaho	Montana	Utah	Wyoming
	Threatened				
Spiranthes diluvialis	Ute ladies' tresses	X			
	Endangered				
None					
	Proposed				
Botrychium lineare	Slender moonwort	X	X		
	Sensitive				
Adoxa moschatellina	Musk-root		X		
Agastache cusickii	Cusick's horse-mint		X		
Agoseris lackschewitzii	Pink agoseris				X
Allium acuminatum	Tapertip onion		X		
Allium parvum	Small onion		X		
Allotropa virgata	Candystick	X	X		
Amerorchis rotundifolia	Round-leaved orchis		X		
Anemone lyallii	Lyall's wood-anemone				X
Anemone narcissiflora ssp zephyra	Zephyr windflower				X
Antennaria aromatica	Aromatic pussytoes				X
Antennaria densifolia	Dense-leaved antennaria		X		
Antennaria flagellaris	Stoloniferous pussytoes				X
Antennaria monocephala	Single-head pussytoes				X
Aquilegia brevistyla	Short-styled columbine		X		
Aquilegia formosa var formosa	Crimson columbine				X
Aquilegia grahamii	Graham's columbine			X	
Arabis fecunda	Sapphire rockcress		X		
Arnica lonchophylla	Northern arnica				X
Artemisia norvegica var piceetorum	Spruce wormwood			X	
Asplenium trichomanes-ramosum	Green spleenwort				X
Astragalus lackschewitzii	Lackschewitz's milkvetch		X		
Astragalus paysonii	Payson's milkvetch	X			X
Astragalus shultziorum	Shultz's milkvetch				X
Athysanus pusillus	Sandweed		X		
Balsamorhiza macrophylla	Large-leafed balsamroot		X		
Bidens beckii	Beck water-marigold		X		
Blechnum spicant	Deer-fern	X			
Botrychium ascendens	Upward-lobed moonwort	X	X		
Botrychium crenulatum	Wavy moonwort		X		
Botrychium echo	Reflected grapefern			X	
Botrychium hesperium	Western moonwort		X		
Botrychium lanceolatum var lanceolatum	Lance-leaved moonwort	X			
Botrychium minganense	Mingan Island moonwort	X			X
Botrychium montanum	Mountain moonwort	X	X		
Botrychium paradoxum	Peculiar moonwort		X	X	
Botrychium pendunculosum	Stalked moonwort	X			
Botrychium pinnatum	Northern moonwort	X			

Scientific name	Common name	Idaho	Montana	Utah	Wyoming
	(Sensitive, continued)				
Botrychium simplex	Least moonwort	X			
Botrychium virginianum	Rattlesnake fern				X
Braya glabella	Arctic braya				X
Bryoria subdivergens			X		
Buxbaumia viridis	Leafless bug-on-a-stick	X			
Calamagrostis tweedi	Cascade reedgrass	X			
Cardamine constancei	Constance's bittercress	X			
Carex amplifolia	Big-leaf sedge		X		
Carex buxbaumii	Buxbaum's sedge	X			
Carex chordorrhiza	Creeping sedge		X		
Carex deweyana var bolanderi	Bolander's sedge				X
Carex diandra	Lesser panicled sedge				X
Carex flava	Yellow sedge	X			
Carex hendersonii	Henderson's sedge	X			
Carex idahoa	Idaho sedge		X		
Carex leptalea	Bristly-stalk sedge	X		X	X
Carex limosa	Mud sedge				X
Carex livida	Pale sedge	X	X		
Carex luzulina var atropurpurea	Black and purple sedge				X
Carex microglochin	False uncinia sedge				X
Carex paupercula	Poor sedge	X			
Carex prairea	Prairie sedge		X		
Carex rostrata	Beaked sedge		X		
Castilleja covilleana	Coville Indian paintbrush		X		
Castilleja crista-galli	Cockscomb paintbrush				X
Castilleja gracillima	Slender Indian paintbrush		X		
Castilleja nivea	Snow paintbrush				X
Cetraria subalpina			X		
Cicuta bulbifera	Bulbet-bearing water hemlock				X
Cirsium eatonii var murdockii	Murdock's thistle			X	
Cirsium longistylum	Long-styled thistle		X		
Clarkia rhomboidea	Common clarkia		X		
Claytonia arenicola	Sand springbeauty		X		
Collema curtisporum	Short-spored jelly lichen	X			
Corydalis caseana	Case's corydalis	X			
Corydalis sempervirens	Pale corydalis		X		
Cryptogramma stelleri	Fragile rockbrake				X
Cymopterus evertii	Evert's waterparsnip				X
Cypripedium fasciculatum	Clustered lady's slipper	X	X	X	
Cypripedium parviflorum	Small yellow lady's slipper		X		
Cypripedium passerinum	Sparrow's-egg lady's slipper		X		
Dasynotus daubernmirei	Daubenmire's dasynotus	X			
Deschampsia danthonioides	Annual hairgrass				X
Descurainia torulosa	Wyoming tansymustard				X
Dodecatheon dentatum	White shooting star	X			
Draba borealis	Boreal draba				X
Draba brachstylis	Shortstyle draba			X	
Draba crassa	Thick-leaf whitlow-grass				X

Scientific name	Common name	Idaho	Montana	Utah	Wyoming
	(Sensitive, continued)				
Draba fladenizensis var pattersonii	White arctic whitlow-grass				X
Draba globosa	Rockcress draba or Beavertip draba			X	X
Draba juniperina	Fewseed draba			X	
Drosera anglica	English sundew		X		X
Drosera intermedia	Spoon-leaved sundew	X			
Drosera linearis	Linear-leaved sundew		X		
Dryopteris cristata	Buckler fern	X	X		
Dryopteris expansa	Spreading woodfern				X
Eburophyton austiniae	Phantom orchid	X			
Eleocharis rostellata	Beaked spikerush		X		
Epilobium palustre	Swamp willow-weed	X			
Epipactis gigantea	Giant helleborine	X	X		
Equisetum sylvaticum	Woodland horsetail				X
Ericameria discoidea var linearis	Narrowleaf goldenweed				X
Erigeron asperugineus	Idaho fleabane		X		
Erigeron evermannii	Evermann fleabane		X		
Erigeron lackschewitzii	Lackschewitz' fleabane		X		
Erigeron untermannii	Indian Canyon fleabane			X	
Eriophorum chamissonis	Russet cottongrass				X
Eriophorum gracile	Slender cottongrass		X		X
Eriophorum viridicarinatum	Green keeled cottongrass	X			
Eritrichum howardii	Howard forget-me-not				X
Eupatorium occidentale	Western boneset		X		
Festuca hallii	Hall's fescue				X
Gaultheria hispidula	Creeping snowberry	X			
Gentianopsis simplex	Hiker's gentian		X		
Goodyera repens	Northern rattlesnake-plantain		X		
Grimmia brittoniae			X		
Grindelia howellii	Howell's gum-weed		X		
Halimolobos perplexa var lemhiensis	Puzzling rockcress		X		
Haplopappus carthamoides var subsquarrosus	Beartooth large-flowered goldenweed		X		
Haplopappus macronema var macronema	Discoid goldenweed		X		
Haplopappus insecticruris	Bug-leg goldenweed	X			
Heterocodon rariflorum	Western pearl-flower		X		
Hookeria lucens	Clear moss	X			
Howellia aquatilis	Water howellia		X		
Ipomopsis crebrifolia	Compact gilia				X
Iris versicolor	Blueflag	X			
Juncus hallii	Hall's rush		X		
Kalmia polifolia	Pale laurel		X		
Kelloggia galioides	Milk kelloggia				X
Kobresia sibirica	Siberian kobresia				X
Kobresia simpliciuscula	Simple bog sedge			X	
Lepidium huberi	Huber's pepperweed			X	
Lepidium integrifolium var integrifolium	Entireleaved pepperweed			X	
Lesquerella carinata var carinata	Keeled bladderpod				X
Lesquerella humilis	Bitterroot bladderpod		X		
Lesquerella paysonii	Payson's bladderpod		X		X

Scientific name	Common name	Idaho	Montana	Utah	Wyoming
	(Sensitive, continued)				
Lesquerella pulchella	Beautiful bladderpod		X		
Lomatium geyeri	Geyer's biscuitroot		X		
Lonicera caerulea var cauriana	Western honeysuckle				X
Lycopodiella inundata	Northern bog clubmoss	X	X		
Lycopodium dendroideum	Groundpine clubmoss	X			
Marsilea vestita var oligospora	Pepperwort				X
Meesia longiseta	Messia	X			
Meesia triquetra			X		
Mentzelia goodrichii	Goodrich's blazingstar			X	
Mertensia bella	Oregon bluebells		X		
Mimulus ampliatus	Spacious monkeyflower	X			
Mimulus clivicola	Bank monkeyflower	X			
Mimulus patulus	Stalk-leaved monkeyflower		X		
Mimulus primuloides	Primrose monkeyflower		X		
Monardella odoratissima var glauca	Mountain wild-mint				X
Najas guadalupensis	Southern naiad				X
Oenothera flava var acutissima	Flaming Gorge evening-primrose			X	
Ophioglossum pusillum	Adder's tongue		X		
Orobanche corymbosa var corymbosa	Flat-top broomrape				X
Orogenia fusiformis	Tapered-root orogenia		X		
Oxytropis podocarpa	Stalked-pod crazyweed		X		
Paeonia brownii	Brown's peony				X
Papaver kluanense	Alpine poppy				X
Parrya nudicaulis	Naked-stemmed parrya				X
Parrya rydbergii	Naked stem wallflower			X	
Pedicularis contorta var ctenophora	Pink coil-beaked lousewort				X
Pellaea suksdorfiana	Smooth cliff-brake				X
Penstemon absarokensis	Absaroka beardtongue				X
Penstemon lemhiensis	Lemhi beardtongue		X		
Penstemon payettensis	Payette beardtongue		X		
Penstemon uintahensis	Unita Mountain beardtongue			X	
Petasites sagittatus	Arrowleaf coltsfoot	X			
Phegopteris connectilis	Northern beechfern	X			
Phlox diffusa ssp scleranthifolia	Diffuse phlox				X
Phlox kelseyi var missoulensis	Missoula phlox		X		
Polygonum douglasii ssp austinae	Austin's knotweed		X		
Polystichum braunii	Braun's sword-fern	X			
Potamogeton friesii	Frie's pondweed				X
Potamogeton obtusifolius	Blunt-leaved pondweed		X		
Potamogeton praelongus	White-stemmed pondweed				X
Potentilla palustris	Marsh cinquefoil			X	
Potentilla quinquefolia	Five-leaf cinquefoil		X		
Potentilla subjuga	Twinleaf cinquefoil				X
Primula incana	Silvery primrose			X	
Pyrrocoma carthamoides var subsquarrosa	Absaroka goldenweed				X
Pyrrocoma clementis var villosa	Hairy tranquil goldenweed				X
Ranunculus gelidus	Timberline buttercup				X
Ranunculus jovis	Jove's buttercup		X		

Scientific name	Common name	Idaho	Montana	Utah	Wyoming
	(Sensitive, continued)				
Salix barrattiana	Barratt's willow		X		
Salix candida	Hoary willow	X			X
Saussurea weberi	Weber's saw-wort		X		X
Saxifraga tempestiva	Storm saxifrage		X		
Scheuchzeria palustris	Pod grass		X		
Scirpus cespitosus	Tufted club-rush		X		
Scripus hudsonianus	Hudson's Bay bullrush	X			
Scirpus subterminalis	Water bulrush		X		
Scorpidium scorpioides			X		
Selaginella selaginoides	Low spike-moss				X
Shoshonea pulvinata	Shoshonea		X		
Silene repens var australis	Creeping campion				X
Sparganium natans	Small bur-reed				X
Sphagnum mendocinum	Peatmoss	X			
Stephanomeria fluminea	Teton wire-lettuce				X
Streptopus streptopoides var brevipes	Kruhsea twisted stalk	X			
Sullivantia hapemanii var hapemanii	Hapeman's sullivantia				X
Symphyotrichum mollis	Soft aster				X
Synthyris platycarpa		X			
Thalictrum alpinum	Alpine meadowrue		X		
Townsendia condensata var anomala	North Fork Easter daisy				X
Townsendia montana var caelilinensis	Mountain townsendia			X	
Trichophorum pumilum	Pygmy bulrush				X
Trientalis arctica	Northern starflower	X			
Trifolium eriocephalum ssp arcuatum	Wooly-head clover		X		
Trifolium gymnocarpon	Hollyleaf clover		X		
Triteleia grandiflora	Large-flower triteleia				X
Utricularia intermedia	Flat-leaved bladderwort		X		
Vaccinium oxycoccos	Bog cranberry	X			
Veratrum californicum	California false-hellebore		X		
Viburnum edule	Squashberry				X
Viola renifolia var brainerdii	Kidney-leaf white violet				X
Waldsteninia idahohensis	Idaho strawberry	X			
Xerophyllum tenax	Western beargrass				X
Totals	216	51	88	21	76

*Species listed include both FS sensitive and BLM special status plants

Appendix K – Analysis data by national forest and BLM district office

Table K-1. Precommercial thinning possible during next decade

	Scheduled in lynx habitat	Scheduled outside lynx habitat	Total scheduled
NATIONAL FOREST			
Idaho			
Clearwater	5,510 acres	7,970 acres	13,480 acres
Idaho Panhandle	80,890 acres	27,990 acres	108,880 acres
Nez Perce	12,370 acres	16,750 acres	29,120 acres
Salmon-Challis	22,000 acres	8,500 acres	30,500 acres
Targhee	36,800 acres	8,200 acres	45,000 acres
Montana			
Beaverhead-Deerlodge	21,280 acres	4,960 acres	26,240 acres
Bitterroot	510 acres	17,890 acres	18,400 acres
Custer	1,010 acres	10,840 acres	11,850 acres
Flathead	49,540 acres	2,300 acres	51,840 acres
Gallatin	26,300 acres	5,000 acres	31,300 acres
Helena	3,830 acres	0	3,830 acres
Kootenai	73,260 acres	50,770 acres	124,030 acres
Lewis and Clark	7,410 acres	720 acres	8,130 acres
Lolo	30,160 acres	9,530 acres	39,690 acres
Utah			
Ashley	7,710 acres	870 acres	8,580 acres
Wyoming			
Bighorn	3,000 acres	8,000 acres	11,000 acres
Bridger-Teton	9,500 acres	0	9,500 acres
Shoshone	4,250 acres	600 acres	4,850 acres
BUREAU OF LAND MANAGEMENT			
Idaho			
Lower Snake River	0	800 acres	800 acres
Upper Columbia	810 acres	2,630 acres	3,440 acres
Upper Snake River	0	500 acres	500 acres
Utah			
BLM-Salt Lake	0	0	0
TOTAL	396,140 acres	184,820 acres	580,960 acres

Acres are estimates rounded to the nearest ten and could change due to changing needs

Table K-2. Precommercial thinning by alternative

	Alternative A	Alternative B	Alternatives C & E	Alternative D
NATIONAL FOREST				
Idaho				
Clearwater	13,480 acres	7,970 acres	7,970 acres	11,550 acres
Idaho Panhandle	108,880 acres	28,150 acres	28,190 acres	101,680 acres
Nez Perce	29,120 acres	16,870 acres	16,870 acres	17,110 acres
Salmon-Challis	30,500 acres	8,720 acres	8,720 acres	14,520 acres
Targhee	45,000 acres	8,570 acres	8,570 acres	9,070 acres
Montana				
Beaverhead-Deerlodge	26,240 acres	4,960 acres	5,000 acres	26,240 acres
Bitterroot	18,400 acres	17,890 acres	17,940 acres	18,040 acres
Custer	11,850 acres	10,840 acres	10,840 acres	11,840 acres
Flathead	51,840 acres	2,800 acres	3,020 acres	35,960 acres
Gallatin	31,300 acres	5,260 acres	5,280 acres	6,310 acres
Helena	3,830 acres	0	40 acres	920 acres
Kootenai	124,030 acres	50,770 acres	51,010 acres	119,240 acres
Lewis and Clark	8,130 acres	720 acres	740 acres	740 acres
Lolo	39,690 acres	9,830 acres	10,830 acres	21,680 acres
Utah				
Ashley	8,580 acres	1,110 acres	1,100 acres	1,880 acres
Wyoming				
Bighorn	11,000 acres	8,030 acres	8,030 acres	8,360 acres
Bridger-Teton	9,500 acres	0	0	9,500 acres
Shoshone	4,850 acres	600 acres	600 acres	2,730 acres
BUREAU OF LAND MANAGEMENT				
Idaho				
Lower Snake River	800 acres	800 acres	800 acres	800 acres
Upper Columbia	3,440 acres	2,630 acres	2,630 acres	2,630 acres
Upper Snake River	500 acres	500 acres	500 acres	500 acres
Utah				
Salt Lake	0	0	0	0
TOTAL	580,960 acres	187,010 acres	188,680 acres	421,300 acres

Table K-3. Precommercial thinning possible during next decade for research, genetic testing and fire-defensible space

	Research PCT		Genetic testing PCT		Defensible space PCT	
	In lynx habitat	Outside habitat	In lynx habitat	Outside habitat	In lynx habitat	Outside habitat
NATIONAL FOREST						
Idaho						
Clearwater	0	0	0	100 ac	0	0
Idaho Panhandle	0	20 ac	40 ac	50 ac	160 ac	1,120 ac
Nez Perce	0	0	0	60 ac	120 ac	170 ac
Salmon-Challis	0	0	0	0	220 ac	90 ac
Targhee	0	0	0	0	370 ac	410 ac
Montana						
Beaverhead-Deerlodge	0	0	40 ac	0	0	0
Bitterroot	50 ac	50 ac	0	50 ac	0	360 ac
Custer	0	0	0	0	0	220 ac
Flathead	180 ac	0	40 ac	0	500 ac	20 ac
Gallatin	20 ac	0	0	0	260 ac	0
Helena	0	0	40 ac	0	0	0
Kootenai	200 ac	0	40 ac	40 ac	0	1,520 ac
Lewis and Clark	0	0	20 ac	0	0	0
Lolo	1,000 ac	0	0	20 ac	300 ac	100 ac
Utah						
Ashley	0	0	0	0	230 ac	0
Wyoming						
Bighorn	0	10 ac	0	0	30 ac	160 ac
Bridger-Teton	0	0	0	0	0	0
Shoshone	0	0	0	0	0	0
BUREAU OF LAND MANAGEMENT						
Idaho						
Lower Snake River	0	0	0	0	0	0
Upper Columbia	0	0	0	0	0	0
Upper Snake River	0	0	0	0	0	0
Utah						
Salt Lake	0	0	0	0	0	0
TOTAL	1,450 ac	80 ac	220 ac	320 ac	2,190 ac	4,170 ac

Acres are estimates rounded to the nearest ten, and could change based on changing needs

Table K-4. Precommercial thinning possible during next decade for planted white pine, whitebark pine and quaking aspen

	Planted white pine		Whitebark pine		Quaking aspen	
	In lynx habitat	Outside habitat	In lynx habitat	Outside habitat	In lynx habitat	Outside habitat
NATIONAL FOREST						
Idaho						
Clearwater	1,930 ac	3,990 ac	0	0	0	0
Idaho Panhandle	36,400 ac	10,920 ac	2,950 ac	0	730 ac	0
Nez Perce	0	0	0	250 ac	0	0
Salmon-Challis	0	0	300 ac	0	1100 ac	430 ac
Targhee	0	0	500 ac	0	0	0
Montana						
Beaverhead-Deerlodge	0	0	0	0	220 ac	50 ac
Bitterroot	0	0	0	0	0	0
Custer	0	0	1,000 ac	0	0	220 ac
Flathead	740 ac	30 ac	0	0	0	0
Gallatin	0	0	1,000 ac	0	30	0
Helena	0	0	500 ac	0	190 ac	0
Kootenai	11,720 ac	4,570 ac	1,560 ac	0	0	2,030 ac
Lewis and Clark	0	0	0	0	0	0
Lolo	300 ac	100 ac	300 ac	0	300 ac	100 ac
Utah						
Ashley	0	0	0	0	390 ac	0
Wyoming						
Bighorn	0	0	0	0	90 ac	240 ac
Bridger-Teton	0	0	1,000 ac	0	0	0
Shoshone	0	0	0	0	0	0
BUREAU OF LAND MANAGEMENT						
Idaho						
Lower Snake River	0	0	0	0	0	0
Upper Columbia	0	0	0	0	0	0
Upper Snake River	0	0	0	0	0	0
Utah						
Salt Lake	0	0	0	0	0	0
TOTAL	51,090 ac	19,610 ac	9,110 ac	250 ac	3,050 ac	3,070 ac

Acres are estimates rounded to the nearest five, and could change based on changing needs

Table K-5. Precommercial thinning possible during next decade for ponderosa pine, western larch, lodgepole pine

	Ponderosa pine		Western larch		Lodgepole pine	
	In lynx habitat	Outside habitat	In lynx habitat	Outside habitat	In lynx habitat	Outside habitat
NATIONAL FOREST						
Idaho						
Clearwater	0	800 ac	1,650 ac	1,590 ac	0	0
Idaho Panhandle	1,700 ac	3,360 ac	31,550 ac	8,960 ac	160 ac	60 ac
Nez Perce	120 ac	1,680 ac	120 ac	1,340 ac	0	0
Salmon-Challis	2,200 ac	850 ac	0	0	2,200 ac	850 ac
Targhee	0	0	0	0	0	0
Montana						
Beaverhead-Deerlodge	0	100 ac	0	0	21,020 ac	4,810 ac
Bitterroot	100 ac	13,600 ac	0	1,070 ac	0	0
Custer	0	10,400 ac	0	0	0	0
Flathead	4950 ac	1,150 ac	27,250 ac	920 ac	0	0
Gallatin	0	200 ac	0	0	0	0
Helena	0	0	190 ac	0	0	0
Kootenai	2,200 ac	12,160 ac	52,750 ac	30,450 ac	0	0
Lewis and Clark	0	180 ac	0	0	0	0
Lolo	300 ac	2,860 ac	9,650 ac	950 ac	0	0
Utah						
Ashley	0	870 ac	0	0	390 ac	0
Wyoming						
Bighorn	90 ac	240 ac	0	0	150 ac	400 ac
Bridger-Teton	0	0	0	0	8,500 ac	0
Shoshone	0	0	0	0	2,130 ac	300 ac
BUREAU OF LAND MANAGEMENT						
Idaho						
Lower Snake River	0	0	0	0	0	0
Upper Columbia	0	0	0	0	0	0
Upper Snake River	0	0	0	0	0	0
Utah						
Salt Lake	0	0	0	0	0	0
TOTAL	11,660 ac	48,450 ac	123,160 ac	45,280 ac	34,550 ac	6,420 ac

Acres are estimates rounded to the nearest 10, and could change based on changing needs

Table K-6. Acres of precommercial thinning by alternative during next decade, full funding compared to historic average funding

	Alternative A		Alternative B		Alternatives C & E		Alternative D	
	Full funding	Historic average	Full funding	Historic average	Full funding	Historic average	Full funding	Historic average
NATIONAL FOREST								
Idaho								
R1 Clearwater	13,480	4,310	7,970	2,550	7,970	2,550	11,550	3,670
R1 Idaho Panhandle	108,880	34,840	28,150	9,010	28,190	9,020	101,680	32,540
R1 Nez Perce	29,120	9,320	16,870	5,400	16,870	5,400	17,110	5,480
R4 Salmon-Challis	30,500	11,290	8,720	3,230	8,720	3,230	14,520	5,370
R4 Targhee	45,000	16,650	8,570	3,170	8,570	3,170	9,070	3,360
Montana								
R1 Beaverhead-Deerlodge	26,240	8,400	4,960	1,590	5,000	1,600	26,240	8,400
R1 Bitterroot	18,400	5,890	17,890	5,730	17,940	5,740	18,040	5,770
R1 Custer	11,850	3,790	10,840	3,470	10,840	3,470	11,840	3,790
R1 Flathead	51,840	16,590	2,800	900	3,020	970	35,960	11,510
R1 Gallatin	31,300	10,020	5,260	1,680	5,280	1,690	6,310	2,020
R1 Helena	3,830	1,230	0	0	40	10	920	290
R1 Kootenai	124,030	39,690	50,770	16,250	51,010	16,320	119,240	38,160
R1 Lewis and Clark	8,130	2,600	720	230	740	240	740	240
R1 Lolo	39,690	12,700	9,830	3,150	10,830	3,470	21,680	6,940
Utah								
R4 Ashley	8,580	3,180	1,100	410	1,100	410	1,880	700
Wyoming								
R2 Bighorn	11,000	6,600	8,030	4,820	8,030	4,820	8,360	5,020
R4 Bridger-Teton	9,500	3,520	0	0	0	0	9,500	3,520
R2 Shoshone	4,850	2,910	600	360	600	360	2,730	1,640
BUREAU OF LAND MANAGEMENT								
Idaho								
Lower Snake River	800	800	800	800	800	800	800	800
Upper Columbia	3,440	3,440	2,630	2,630	2,630	2,630	2,630	2,630
Upper Snake River	500	500	500	500	500	500	500	500
Utah								
Salt Lake	0	0	0	0	0	0	0	0
TOTAL	580,960	198,270	187,010	65,880	188,680	66,400	421,300	142,350

Before the Canada lynx was listed as a threatened species, Congress funded units in the amendment area to do about 20,000 acres of precommercial thinning a year -- amounts varied somewhat from year to year. FS Regions 1 and 4 both had many acres scheduled to be thinned, but were funded to do only about 30 to 40 percent. FS Region 2 had a smaller program and was funded to do about 60 percent. The BLM had quite a small program, which was entirely funded.

	FS R1	FS R2	FS R4	BLM	Total/average
1994-1998 average acres funded	15,000	1,000	3,600	500	20,000
Percent funded	32%	60%	37%	100%	34%

Table K-7. Grazing allotments

				Active allotments with lynx habitat			
	Number of allotments	With lynx habitat	Active with lynx habitat	Less than 25 percent	From 25 to 50 percent	More than 50 percent	With similar direction‡
NATIONAL FOREST							
Idaho							
Clearwater	17	0	0	0	0	0	0
Idaho Panhandle	11	9	8	1	2	5	6
Nez Perce	29	15	12	3	3	6	12
Salmon-Challis	114	85	85	49	27	9	85
Targhee	145	100	86	8	24	54	86
Montana							
Beaverhead-Deerlodge	318	318	315	91	80	144	315
Bitterroot	20	19	15	9	2	4	15
Custer	133	24	24	13	4	7	24
Flathead	20	19	11	0	3	8	11
Gallatin	98	98	94	20	36	38	0
Helena	88	88	75	27	30	18	25
Kootenai	44	27	17	7	3	7	17
Lewis and Clark	269	146	143	21	11	111	73
Lolo	36	18	13	2	5	6	13
Utah							
Ashley	68	68	51	6	19	26	51
Wyoming							
Bighorn	106	61	59	13	23	23	59
Bridger-Teton	278	278	236	0	236	0	236
Shoshone	84	47	45	21	14	10	10
BUREAU OF LAND MANAGEMENT							
Idaho							
Lower Snake River	300	0	0	0	0	0	0
Upper Columbia	327	327	326	315	6	5	326
Upper Snake River	1,241	13	13	13	0	0	13
Utah							
Salt Lake	5	5	5	3	2	0	5
Totals	3,751	1,765	1,633	622	530	481	1,384

‡ *Similar direction* includes plan standards for riparian habitat protection or other management direction for grazing

Table K-8. Designated or groomed winter routes and designated play areas

	All groomed or designated routes	Inside lynx habitat			
		Groomed or designated routes	Average designated routes groomed/year	Designated routes that could be groomed	Designated play areas (Number & acres)
NATIONAL FOREST					
Idaho					
Clearwater	1,025 miles	500 miles	425 miles	75 miles	0
Idaho Panhandle	1,450 miles	975 miles	475 miles	500 miles	0
Nez Perce	2,275 miles	1,075 miles	275 miles	775 miles	0
Salmon-Challis	1,500 miles	1,125 miles	225 miles	900 miles	0
Targhee	1,000 miles	400 miles	400 miles	0	0
Montana					
Beaverhead-Deerlodge	1,000 miles	575 miles	275 miles	300 miles	0
Bitterroot	250 miles	100 miles	25 miles	75 miles	0
Custer	50 miles	25 miles	0	25 miles	0
Flathead	175 miles	175 miles	175 miles	0	0
Gallatin	425 miles	350 miles	305 miles	50 miles	0
Helena	375 miles	275 miles	200 miles	75 miles	2 in 3,750 acres
Kootenai	425 miles	250 miles	175 miles	75 miles	0
Lewis & Clark	825 miles	600 miles	225 miles	400 miles	2 in 300 acres
Lolo	700 miles	375 miles	300 miles	75 miles	0
Wyoming					
Bighorn	425 miles	50 miles	25 miles	25 miles	0
Bridger-Teton	850 miles	850 miles	750 miles	100 miles	0
Shoshone	500 miles	150 miles	100 miles	50 miles	0
Utah					
Ashley	125 miles	125 miles	120 miles	0	0
BUREAU OF LAND MANAGEMENT UNITS					
Idaho					
Upper Snake River	0	0	0	0	0
Lower Snake River	0	0	0	0	0
Upper Columbia/Salmon	50 miles	25 miles	25 miles	0	0
Utah					
Salt Lake	0	0	0	0	0
Total	13,425 miles	8,000 miles	4,500 miles (56%)	3,500 miles (44%)	4 in 4,050 acres

The table contains estimated miles for each unit rounded to the nearest 25.
The baseline miles need to be established by each unit once a decision is made.
The lynx amendment is not setting these as baseline figures.

Table K-9. Recreation special use permits and agreements

	Recreation SUP's & agreements	Winter recreation SUP's and agreements	Winter recreation SUP's and agreements in lynx habitat
NATIONAL FOREST			
Idaho			
Clearwater	37	6	3
Idaho Panhandle	195	25	24
Nez Perce	64	17	15
Salmon-Challis	114	14	14
Targhee	325	24	21
Montana			
Beaverhead-Deerlodge	28	4	4
Bitterroot	211	7	7
Custer	17	0	0
Flathead	201	8	8
Gallatin	376	30	30
Helena	58	8	6
Kootenai	61	19	19
Lewis and Clark	21	21	21
Lolo	141	24	20
Utah			
Ashley	24	2	2
Wyoming			
Bighorn	343	86	85
Bridger-Teton	227	39	39
Shoshone	279	25	20
BUREAU OF LAND MANAGEMENT			
Idaho			
Lower Snake River	0	0	0
Upper Columbia	0	0	0
Upper Snake River	0	0	0
Utah			
Salt Lake	0	0	0
Total	2,722	359 (15%)	338 (94%)

Table K-10. Cross-country and downhill ski areas operating under special use permit

		Inside lynx habitat			
	Ski areas	Number	Acres	Planning expansion	New areas planned
NATIONAL FOREST					
Idaho					
Clearwater	0	0	0	0	0
Idaho Panhandle †	2	0	0	1	0
Nez Perce	1	0	0	0	0
Salmon-Challis ‡	1	1	1,401 acres	1	0
Targhee	2	2	974 acres	2	0
Montana					
Beaverhead-Deerlodge	2	2	1,999 acres	1	0
Bitterroot ‡	0	0	0	0	0
Custer	1	1	1,288 acres	1	0
Flathead	6	5	3,749 acres	1	0
Gallatin	2	2	956 acres	1	0
Helena	3	2	320 acres	0	0
Kootenai	3	1	2,640 acres	1	1
Lewis & Clark	3	3	1,498 acres	1	0
Lolo †	3	2	1,412 acres	1	0
Wyoming					
Bighorn	6	1	400 acres	1	0
Bridger-Teton	5	5	4,620 acres	0	0
Shoshone	10	1	2 acres	0	0
Utah					
Ashley	0	0	0	0	0
BUREAU OF LAND MANAGEMENT					
Idaho					
Upper Snake River	2	0	0	0	0
Lower Snake River	0	0	0	0	0
Upper Columbia/Salmon	1	1	8,000 acres	0	0
Utah					
Salt Lake Office	0	0	0	0	0
Total	53	29	29,259 acres	12	1

† The Idaho-Panhandle and Lolo national forests both have parts of the Lookout Pass ski area in their administrative boundaries. On this report, it's listed under the Lolo in Montana.

‡ The Salmon-Challis and Bitterroot national forests both have parts of the Lost Trail ski area in their administrative boundaries. On this report, it's listed under the Salmon Challis in Idaho.

Table K-11. Mining operations and wells in lynx habitat

	Wells in last 10 years		Foreseeable	Minerals operations	
	Drilled	Outside habitat	wells	Percent	Name
NATIONAL FOREST					
Idaho					
Clearwater	0	0	0	0	-
Idaho Panhandle	0	0	0	0	-
Nez Perce	0	0	0	0	-
Salmon-Challis	0	0	0	0	-
Targhee	0	0	0	0	-
Montana					
Beaverhead-Deerlodge	0	0	0	2%	Beal & Golden Jubilee
Bitterroot	0	0	0	0	-
Custer	1	0	2	1%	Stillwater
Flathead	0	0	0	0	-
Gallatin	0	0	0	1%	East Boulder
Helena	0	0	0	2-3%	-
Kootenai	0	0	0	1%	Troy
Lewis and Clark	0	0	2	0	-
Lolo	0	0	0	1-5%	-
Utah					
Ashley	0	0	3	1	-
Wyoming					
Bighorn	0	0	0	0	-
Bridger-Teton	0	Several	0	0	-
Shoshone	0	1	1	0	-
BUREAU OF LAND MANAGEMENT					
Idaho					
Lower Snake River	0	0	0	0	-
Upper Columbia	0	0	0	0	-
Upper Snake River	0	0	0	0	-
Utah					
Salt Lake	0	0	0	0	-
Total	1	1	8+	-	-

Table K-12. Forest roads in lynx habitat, part 1

			Paved 2+ lanes		Environmental paving	
	Maintenance level 2	Maintenance levels 3-5	Paved last 10 years	Planned next 10 years	Paved last 5 years	Planned next 5 years
NATIONAL FOREST						
Idaho						
Clearwater	299 miles	184 miles	0	0	0	0
Idaho Panhandle	1,166 miles	830 miles	0	0	0	0
Nez Perce	386 miles	372 miles	0	7.0 miles	0	0
Salmon-Challis	670 miles	420 miles	0	0	0	0
Targhee	138 miles	557 miles	2.2 miles	5.0 miles	0	0
Montana						
Beaverhead-Deerlodge	1,050 miles	741 miles	10.0 miles	5.0 miles	0	0
Bitterroot	120 miles	130 miles	0	0	0	0
Custer	95 miles	50 miles	0	6.6 miles	0	0
Flathead	500 miles	795 miles	0	0	0	1.0 miles
Gallatin	981 miles	202 miles	0.5 miles	8.0 miles	0	0
Helena	447 miles	168 miles	0	5.0 miles	0	0
Kootenai	400 miles	450 miles	0	0	1.0 miles	0
Lewis and Clark	327 miles	323 miles	0	0	0	0
Lolo	704 miles	621 miles	0	7.1 miles	0	0
Utah						
Ashley	211 miles	353 miles	0	1.7 miles	0	0
Wyoming						
Bighorn	125 miles	51 miles	0	0	0	0
Bridger-Teton	848 miles	624 miles	0	0	1.0 miles	1.0 miles
Shoshone	197 miles	58 miles	2.0 miles	0	0	0
BUREAU OF LAND MANAGEMENT						
Idaho						
Lower Snake River	0 miles	0	0	0	0	0
Upper Columbia	17	65 miles	0	0	0	0.
Upper Snake River	1	0	0	0	0	0
Utah						
Salt Lake	8	0	0	0	0	0
Total	8,690 miles	6,994 miles	14.7 miles	45.4 miles	2 miles	2 miles

Table K-13. Forest roads in lynx habitat, part 2

	New open last 5 years	New open planned next 5 years	Upgrades planned next 5 years	On ridge-top planned next 10 years
NATIONAL FOREST				
Idaho				
Clearwater	0.4 miles	0	7.2 miles	2.8 miles
Idaho Panhandle	0.7 miles	0	0	0
Nez Perce	0	0	0	0
Salmon-Challis	0	0	12.0 miles	0
Targhee	0.8 miles	2.5 miles	5.0 miles	0.2 miles
Montana				
Beaverhead-Deerlodge	0.3 miles	2.4 miles	1.5 miles	0
Bitterroot	0	0	0	0
Custer	0	0	14.0 miles	0
Flathead	2.0 miles	0	0	0
Gallatin	0	0	5.0 miles	2.0 miles
Helena	0	0	20.0 miles	0
Kootenai	0	0	4.0 miles	0
Lewis and Clark	0	0	0	0
Lolo	0	0	63.4 miles	0
Utah				
Ashley	0	0	1.7 miles	0
Wyoming				
Bighorn	0.2 miles	0	0	0
Bridger-Teton	10.0 miles	0	100.0 miles	2.0 miles
Shoshone	0	0	3.6 miles	0
BUREAU OF LAND MANAGEMENT				
Idaho				
Lower Snake River	0	0	0	0
Upper Columbia	0	4.0 miles	0	0
Upper Snake River	0	0	0	0
Utah				
Salt Lake	0	0	0	0
TOTAL	14.4 miles	8.9 miles	237.4 miles	7.0 miles

Table K-14. Economic effects of precommercial thinning restrictions after a decade, assuming full funding

	Alternative A		Alternative B		Alternatives C & E		Alternative D	
	Employment	Labor Income ($M)	Employment	Labor Income ($M)	Employment	Labor Income ($M)	Employment	Labor Income ($M)
NATIONAL FOREST								
Idaho								
Clearwater	155	$2,158	91	$1,276	91	$1,276	99	$1,385
Idaho Panhandle	1,195	$16,415	309	$4,244	309	$4,250	836	$11,483
Nez Perce	235	$3,281	136	$1,901	136	$1,901	138	$1,928
Salmon-Challis	320	$3,566	91	$994	91	$1,020	152	$1,698
Targhee	467	$5,196	89	$990	89	$990	94	$1,047
Montana								
Beaverhead-Deerlodge	309	$2,996	58	$566	59	$571	39	$2,996
Bitterroot	164	$1,359	159	$1,321	160	$1,325	160	$1,333
Custer	117	$1,405	107	$1,286	107	$1,286	117	$1,404
Flathead	421	$3,605	23	$195	25	$210	220	$1,881
Gallatin	185	$2,196	31	$369	31	$370	37	$441
Helena	34	$321	0	$0	0	$0	0	$0
Kootenai	1,004	$8,730	411	$3,574	413	$3,591	725	$6,304
Lewis and Clark	56	$688	5	$61	5	$61	5	$61
Lolo	402	$3,436	100	$851	110	$938	165	$1,408
Utah								
Ashley	27	$349	3	$45	3	$45	6	$76
Wyoming								
Bighorn	96	$1,113	70	$813	70	$813	73	$846
Bridger-Teton	96	$1,071	0	$0	0	$0	96	$1,071
Shoshone	27	$274	3	$34	3	$34	15	$154
BUREAU OF LAND MANAGEMENT								
Idaho								
Lower Snake River	8	$94	8	$94	8	$94	8	$94
Upper Columbia	38	$519	29	$397	29	$397	29	$397
Upper Snake River	5	$58	5	$58	5	$58	5	$58
Utah								
Salt Lake	0	$0	0	$0	0	$0	0	$0

Table K-15. Comparative employment and labor income effects after a decade of precommercial thinning restrictions, assuming full funding

	Employment effects			Labor income effects		
	Alt B vs Alt A	Alts C & E vs Alt A	Alt D vs Alt A	Alt B vs Alt A	Alts C & E vs Alt A	Alt D vs Alt A
NATIONAL FOREST						
Idaho						
Clearwater	-64	-64	-56	-$882	-$882	-$773
Idaho Panhandle	-886	-886	-359	-$12,171	-$12,165	-$4,932
Nez Perce	-99	-99	-97	-$1,380	-$1,380	-$1,353
Salmon-Challis	-229	-229	-168	-$2,546	-$2,546	-$1,868
Targhee	-378	-378	-373	-$4,206	-$4,206	-$4,149
Montana						
Beaverhead-Deerlodge	-251	-250	0	-$2,430	-$2,425	0
Bitterroot	-5	-4	-4	-$38	-$34	-$27
Custer	-10	-10	0	-$120	-$120	-$1
Flathead	-398	-396	-201	-$3,411	-$3395	-$1,724
Gallatin	-154	-154	-148	-$1,827	-$1,825	-$1,755
Helena	-34	-34	-34	-$321	-$321	-$321
Kootenai	-593	-591	-279	-$5,157	-$5,140	-$2,427
Lewis and Clark	-51	-51	-51	-$627	-$627	-$627
Lolo	-302	-292	-237	-$2,585	-$2,499	-$2,029
Utah						
Ashley	-24	-24	-21	-$304	-$304	-$272
Wyoming						
Bighorn	-26	-26	-23	-$301	-$301	-$267
Bridger-Teton	-96	-96	0	-$1,071	-$1,071	$0
Shoshone	-24	-24	-12	-$240	-$240	-$120
BUREAU OF LAND MANAGEMENT						
Idaho						
Lower Snake River	0	0	0	$0	$0	$0
Upper Columbia	-9	-9	-9	-$122	-$122	-$122
Upper Snake River	0	0	0	$0	$0	$0
Utah						
Salt Lake	0	0	0	$0	$0	$0

Table K-16. Economic effects of precommercial thinning restrictions after a decade, assuming historic average funding

	Alternative A		Alternative B		Alternatives C & E		Alternative D	
	Employment	Labor Income ($M)	Employment	Labor Income ($M)	Employment	Labor Income ($M)	Employment	Labor Income ($M)
NATIONAL FOREST								
Idaho								
Clearwater	50	$691	29	$408	29	$408	32	$443
Idaho Panhandle	382	$5,253	99	$1,358	99	$1,360	267	$3,675
Nez Perce	75	$1,050	44	$608	44	$608	44	$617
Salmon-Challis	118	$1,319	34	$377	34	$377	56	$628
Targhee	173	$1.922	33	$366	33	$366	35	$387
Montana								
Beaverhead-Deerlodge	99	$959	19	$181	19	$183	99	$959
Bitterroot	52	$435	51	$423	51	$424	51	$426
Custer	37	$450	34	$411	34	$411	37	$449
Flathead	135	$1,154	7	$62	8	$67	70	$602
Gallatin	59	$703	10	$118	10	$119	12	$141
Helena	11	$103	0	$0	0	$1	0	$25
Kootenai	321	$2,794	132	$1,144	132	$1,149	232	$2,017
Lewis and Clark	18	$220	2	$19	2	$20	2	$20
Lolo	129	$1,100	32	$272	35	$300	53	$451
Utah								
Ashley	10	$129	1	$17	1	$17	2	$28
Wyoming								
Bighorn	58	$668	42	$488	42	$488	44	$508
Bridger-Teton	36	$396	0	$0	0	$0	36	$396
Shoshone	16	$165	2	$20	2	$20	9	$93
BUREAU OF LAND MANAGEMENT								
Idaho								
Lower Snake River	8	$94	8	$94	8	$94	8	$94
Upper Columbia	38	$519	29	$397	29	$397	29	$397
Upper Snake River	5	$58	5	$58	5	$58	5	$58
Utah								
Salt Lake	0	$0	0	$0	0	$0	0	$0

Table K-17. Comparative employment and labor income effects after a decade of precommercial thinning restrictions, assuming historic average funding

	Employment effects			Labor income effects		
	Alt B vs Alt A	Alts C & E vs Alt A	Alt D vs Alt A	Alt B vs Alt A	Alts C & E vs Alt A	Alt D vs Alt A
NATIONAL FOREST						
Idaho						
Clearwater	-21	-21	-18	-$282	-$282	-$247
Idaho Panhandle	-283	-283	-115	-$3,895	-$3,893	-$1,578
Nez Perce	-31	-31	-31	-$442	-$442	-$433
Salmon-Challis	-84	-84	-62	-$942	-$942	-$691
Targhee	-140	-140	-138	-$1,556	-$1,556	-$1,535
Montana						
Beaverhead-Deerlodge	-80	-80	0	-$778	-$776	0
Bitterroot	-1	-1	-1	-$12	-$11	-$9
Custer	-3	-3	0	-$38	-$38	$0
Flathead	-128	-127	-65	-$1,091	-$1,086	-$552
Gallatin	-49	-49	-47	-$585	-$584	-$562
Helena	-11	-11	-11	-$103	-$102	-$78
Kootenai	-189	-189	-89	-$1,650	-$1,645	-$777
Lewis and Clark	-16	-16	-16	-$201	-$200	-$200
Lolo	-98	-94	-76	-$827	-$800	-$649
Utah						
Ashley	-9	-9	-8	-$112	-$112	-$101
Wyoming						
Bighorn	-16	-16	-14	-$180	-$180	-$160
Bridger-Teton	-36	-36	0	-$396	-$396	$0
Shoshone	-14	-14	-7	-$144	-$144	-$72
BUREAU OF LAND MANAGEMENT						
Idaho						
Lower Snake River	0	0	0	$0	$0	$0
Upper Columbia	-9	-9	-9	-$122	-$122	-$122
Upper Snake River	0	0	0	$0	$0	$0
Utah						
Salt Lake	0	0	0	$0	$0	$0

Appendix L – Cumulative effects

The following past, present, and reasonably foreseeable programmatic actions have or will affect units in the amendment area. These actions were used to evaluate the cumulative programmatic effects of the amendment. Several other actions were considered but were not included in the cumulative effects analysis because they either did not affect lynx habitat, or were not of the nature to have cumulative effects (see Project Record, Summary of actions reviewed for cumulative effects, where no cumulative effect was noted).

Existing land & resource management plans & land use plans, as amended

Existing plans form the baseline of effects. The effects of these plans have previously been determined and disclosed in appropriate NEPA documents.

Past programmatic amendments & federal policies that affect units in the amendment area

Past programmatic actions either amended existing plans, or added or changed higher-level policy that affected existing plans. Policy decisions have been incorporated into the CFRs (Code of Federal Regulations). Both amendments and policy decisions are listed because they changed management direction similar to the lynx amendment, or because they affected many existing plans in the amendment area.

Past amendments

PACFISH & INFISH

PACFISH (the 1994 Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho and Portions of California) and INFISH (the 1996 Inland Native Fish Strategies) amended plans, establishing management requirements within riparian habitat conservation areas that apply to all FS and BLM units with lynx habitat west of the Continental Divide. PACFISH and INFISH generally require retaining vegetation near streams and wetlands.

PACFISH and INFISH

- Improve habitat for wildlife, plant and aquatic species
- May reduce amount of area available for timber harvest
- May increase insect and disease in some areas
- May increase fuel buildup in some areas
- May reduce number of AUMs in grazing allotments or affect the timing of operations
- May increase costs for transportation systems, recreation sites, and mineral and energy development

OHV (off highway vehicle) amendment for Montana

In January 2001, this amendment applying to NF lands in Montana

established a new standard restricting yearlong, wheeled motorized cross-country travel where it was not already restricted, with certain exceptions.

The OHV amendment

- Improves habitat for wildlife, plant and aquatic species
- Has no effect on fire management, forest management, grazing, transportation systems, mineral and energy development, winter recreation or land acquisition

Past policy decisions

BLM Healthy Rangeland Initiative

This 1998 policy incorporated at 43 CFR 4180 the Healthy Rangeland standards and guidelines that describe how livestock grazing is managed on all BLM lands. The policy requires certain habitat conditions be provided for terrestrial and aquatic species.

The Healthy Rangeland Initiative

- Improves habitat for wildlife, including lynx, plant and aquatic species
- May reduce number of AUMs in grazing allotments or affect the timing of operations
- Has no effect on fire management, forest management, transportation systems, mineral and energy development, winter recreation or land acquisition

The Roads Policy

This 2001 policy incorporated at 36 CFR 212 provides the FS direction about its transportation system. Adopted after the LCAS was finalized, the Roads Policy gives managers a scientific analysis process to inform their decision-making. It directs the agency to maintain a safe, environmentally sound road network that's responsive to public needs and affordable to manage, where unneeded roads are decommissioned.

The Roads Policy generally has no effects since it is an analysis process. It's likely to improve habitat for wildlife, plant and aquatic species.

Roadless Area Conservation Strategy, "The Roadless Policy"

In January 2001, the Roadless Policy was incorporated at 36 CFR 294, prohibiting road construction and reconstruction, and timber removal in inventoried roadless areas on NF lands, with certain exceptions.

In May of 2001, a preliminary injunction was issued by the District Court of Idaho against implementing the Roadless Policy. This injunction was vacated by the 9th Circuit Court of Appeals. However, in July 2003, the District Court of Wyoming again enjoined implementation of the Roadless Policy. Therefore, the policy is not in effect.

Due to the pending litigation, interim management direction was issued July 27, 2001 regarding management of inventoried roadless areas (Interim Directive 1920-2001-1). This interim directive expired on June 14, 2003. Although the interim directive has expired the agency still intends to limit the amount of road construction in roadless areas.

The Roadless Policy, if fully implemented

- Improves habitat for wildlife, plant and aquatic species, so cumulatively contributes to the conservation of lynx
- May increase fire risk in unroaded lands because of reduced timber removal
- May change user recreational experiences
- May limit development of some ski areas
- May change which areas are available for mineral and energy development
- Would have only a limited affect on grazing, mostly by reducing the forage created by timber harvest
- Would have no effect on land acquisition

For this analysis, it is assumed that road construction in roadless areas would be limited; therefore many of the effects described in the Roadless Area Conservation EIS would still occur.

National Fire Plan

The 2000 National Fire Plan seeks to manage the impact of wildfires on communities and the environment by setting goals for wildland fire policy for the FS and BLM.

10-Year Comprehensive Strategy

The 2001 10-Year Comprehensive Strategy takes a collaborative approach to reducing wildland fire risks to communities and the environment for the FS, also setting goals for wildland fire policy.

Both the National Fire Plan and the 10-Year Comprehensive Strategy share goals to

- Improve fire prevention and suppression
- Promote community assistance
- Restore fire-adapted ecosystems (post-fire restoration)
- Reduce hazardous fuels

The Development of a Collaborative Fuel Treatment Program

The 2003 multiparty MOU (memorandum of understanding) describes a criterion for selecting FS fuel treatment projects, defining high-priority areas as the WUI (wildland urban interface) and forest Condition Classes 2 and 3 outside the WUI (see the *Fire* section in Chapter 3).

These documents do not prescribe specific outcomes; they are not programmatic decisions. They merely identify actions that should be taken to respond to the National Fire Plan.

Even though they don't specify outcomes, the direction set forth in these documents was considered in the effects analysis. Estimates, based on FIA data for Montana, were made to approximate the amount of lynx habitat that could be affected by fuel treatments and how the alternatives may affect implementing the National Fire Plan.

The National Fire Plan

- Is likely to improve habitat for some wildlife, plant and aquatic species and reduce habitat for others
- Likely will not effect on grazing, transportation systems, winter

recreation, land acquisition or mineral & energy development
- Is likely to reduce winter snowshoe hare habitat if treated areas are not allowed to re-grow densely

Energy Implementation Plan
The 2001 FS Energy Implementation Plan was written to implement elements of Executive Order 13212, *Actions to Expedite Energy Related Projects*, also called the National Energy Plan. The National Energy Plan encourages agencies to "...expedite their review of permits and or take other actions necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections..."

Priority areas were identified in areas with a high potential for energy development. The Custer, Ashley and Bridger-Teton NFs were identified as high priority in the planning area because they have oil and gas, even though the potential for oil and gas occurrence and development is rated low or very low. Further, most oil and gas leases take place outside lynx habitat.

The Energy Implementation Plan does not prescribe any specific outcome and is not a programmatic decision. It merely identifies actions that should be taken to respond to the National Energy Plan.

Even though it doesn't specify outcomes, the direction set forth was considered in the effects analysis. The National Energy Plan would have limited cumulative effects on resources in lynx habitat because most of the federal oil and gas leases occur outside lynx habitat.

Pending actions

Pending actions are programmatic actions where a decision has not yet been rendered, but are well into the planning process with reasonably foreseeable effects.

Forest Plan amendments for access management in the Selkirk and Cabinet/Yaak Grizzly Bear Recovery Zones
The Kootenai, Idaho Panhandle, and Lolo NFs have prepared a programmatic EIS to change existing plan objectives, standards and guidelines about motorized access in the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones.

The preferred alternative, Alternative E, would set road densities and core areas for each BMU (bear management unit) reflecting the unique features of each BMU. A decision is expected by the end of the year.

The grizzly bear access management amendment
- Could improve habitat for wildlife, plant and aquatic species
- May increase fire risk lands where access is restricted
- Could reduce timber harvest
- Could reduce areas available for precommercial thinning
- May change recreational user experiences, especially where vegetation grows back in restricted roads

- Would not affect mineral and energy development, grazing or land acquisition

Forest Plan amendments for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests

The Beaverhead, Bridger-Teton, Custer, Gallatin, Shoshone, and Targhee NFs are preparing a programmatic EIS to change existing plan objectives, standards and guidelines for management of grizzly bear habitat security, developed sites and livestock within the Grizzly Bear Recovery Area (*Federal Register*, Vol. 68, No. 136, pp. 41999-42000).

The proposed action would promote the continued recovery of the Yellowstone grizzly bear population. Forest-wide standards are proposed to (1) maintain secure habitat at 1998 levels through management of motorized access routes, with short-term deviations allowed under specific conditions, (2) do not exceed the number of commercial livestock allotments and the number of permitted domestic sheep Animal Months (AMs) from the 1988 level, and (3) manage developed sites at 1998 levels, with some exceptions for administrative and maintenance needs.

The grizzly bear management amendment

- Could maintain habitat for wildlife, including lynx, plant and aquatic species
- Would not affect mineral and energy development, or land acquisition
- Would have no net change on grazing or developed recreation

Forest Plan amendment for wildland fire management on the Bridger-Teton National Forest

The Bridger-Teton NF is preparing a programmatic EA to change existing plan objectives, standards and guidelines for management of wildland fire outside wilderness areas.

The wildland fire management amendment could

- Maintain and improve habitat for wildlife
- Would not affect mineral and energy development, grazing, recreation or land acquisition

Forest Plan amendment for winter motorized recreation on the Flathead National Forest.

The Flathead NF is preparing a programmatic EIS to add a new forest-wide standard that would incorporate the Winter Recreation Amendment Maps into the Forest Plan, providing direction on where winter motorized use is allowed, restricted and prohibited. Other management direction would be reviewed and clarified as needed to provide clear direction and remove inconsistencies regarding winter motorized access.

The winter motorized recreation amendment could

- Maintain and improve habitat for wildlife
- Would not affect mineral and energy development, grazing, or land acquisition

- Could change user experiences and winter recreation opportunities on the Flathead National Forest.

Actions on lands not part of the Northern Rockies Lynx amendment, but in the Northern Rockies Geographic area.

Past Actions

Yellowston and Grand Teton National Park snowmobile regulations

In March 2003, the Park Service issued a decision about snowmobile use in Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway. The decision will limit the number of snowmobiles allowed per day; implement both the best available technology for snowmobiles and an adaptive management program and incorporate guided access for snow machines.

The snowmobiling regulations

- Would maintain habitat for wildlife, plant and aquatic species
- Have no effect on fire management, forest management, transportation systems, mineral and energy development, grazing or land acquisitions
- Could change winter recreation user experiences

Private lands

Several private timber companies have developed lynx management plans, including the Boise-Cascade Corporation in central Idaho and eastern Washington, Plum Creek Timber Company, Ltd. in Idaho and Montana, and Stimson Timber Company in northern Idaho and eastern Washington.

Generally, these plans were developed to respond to the legal requirement that on private lands, a landowner is required to not act in ways that would result in the "taking" of lynx as defined under the Endangered Species Act. Private lands are not required to manage habitat to conserve lynx.

Private-land with lynx management plans

- Could improve habitat conditions for lynx and other wildlife
- Would have no effect on effect on fire management, forest management, transportation systems, mineral and energy development, grazing or land acquisition

Private lands without lynx management plans

- Could reduce the quality and quantity of lynx habitat and habitat for other species.
- Would have no effect on fire management, forest management, transportation systems, mineral and energy development, grazing or land acquisition

Pending actions

Forest Plan revision, amendments on NF and BLM lands not part of this amendment

NF lands inside the geographic area but not part of this amendment are either in the process of revising or will soon

begin revising their plans to incorporate measures to conserve lynx. BLM units will either amend or their revise plans. In the meantime, recommendations from the LCAS are being considered during project planning and implementation.

The following summarizes these planning efforts

- In Region 4, the Payette, Boise, Sawtooth, Caribou, Wasatch-Cache and Unita NFs have nearly completed revision, using information from this amendment
- In Region 6, the Colville, Umatilla, Wallowa-Whitman, Malheur and Ochoco NFs will address lynx later
- BLM units in Montana are developing a habitat conservation strategy for lynx (*Federal Register*, Vol. 68, No. 81, p 22412-22414). In Wyoming and Utah, BLM units are undergoing a similar process.

Proposed Issuance of an Incidental Take Permit to the Montana Department of Natural Resources and Conservation on Forested State Trust Lands in Montana

The Fish and Wildlife Service is preparing an EIS to address the proposed issuance of an incidental take permit to allow take of species on State Trust lands administered by the Montana DNRC (Department of Natural Resources and Conservation) for activities primarily related to forest management. The DNRC is preparing a HCP (Habitat Conservation Plan) as part of the application for the permit. (*Federal Register*, Vol. 68. No. 81, pp. 22412-22414, April 28, 2003).

For the proposed HCP, the DNRC would develop specific conservation measures for the following categories: biodiversity and silviculture, road management, watershed/riparian areas, grazing on classified forest lands, weed management, land use planning, administration and implementation.

The development of an HCP and issuance of a taking permit

- Could improve habitat for wildlife, plant and aquatic species
- Could reduce timber harvest on state lands
- Could reduce areas available for precommercial thinning on state lands
- May change recreational user experiences
- Would not affect mineral and energy development, or land acquisition
- May change grazing practices on state lands

Appendix M – FIA analysis for fuel treatment

Assumptions:

- Treatments would occur equally everywhere
- WUI (wildland urban interface) is defined as within one mile of human habitation, which is conservatively defined as just one structure in ten square miles
- Analysis is for Montana only
- 3,578,000 acres in Montana are inside the WUI – 1,685,000 acres are lynx habitat and 1,893,000 are not
- 8,335,000 acres in Montana are outside the WUI – 5,519,000 acres are lynx habitat and 2,816,000 acres are not
- In Montana about 54,000 acres of fuel treatments are planned per year
- *38,000 acres* of fuel treatment would occur inside the
- *16,000 acres* of fuel treatment would occur outside the WUI
- *High density* winter snowshoe hare foraging habitat is 5,000+ trees per acre in young forests and 2,500+ trees per acre in multistoried forests
- *Low density* winter snowshoe hare foraging habitat is 2,500 to 5,000 trees per acre in young forests and 1,000 to 2,500+ trees per acre in multistoried forests

Table M-1. Fuel treatment in Montana

Forage category	Forage category acres		Montana acres		Percent		R1 fuel treatment acres		Montana fuel treatment		years per decade		Montana fuel treatment per decade
Inside WUI													
High density	382,000	÷	3,578,000	=	10%	x	38,000	=	3,800 acres	x	10	=	38,000 acres
Low density	307,000	÷	3,578,000	=	9%	x	38,000	=	3,420 acres	x	10	=	34,200 acres
Lynx habitat but not good forage	996,000	÷	3,578,000	=	28%	x	38,000	=	10,640 acres	x	10	=	106,400 acres
Not lynx habitat	1,893,000	÷	3,578,000	=	53%	x	38,000	=	20,140 acres	x	10	=	201,400 acres
Outside WUI													
High density	1,460,000	÷	8,335,000	=	17%	x	16,000	=	2,720 acres	x	10	=	27,200 acres
Low density	1,065,000	÷	8,335,000	=	13%	x	16,000	=	2,080 acres	x	10	=	20,800 acres
Lynx habitat but not good forage	2,994,000	÷	8,335,000	=	36%	x	16,000	=	5,760 acres	x	10	=	57,600 acres
Not lynx habitat	2,816,000	÷	8,335,000	=	34%	x	16,000	=	5,440 acres	x	10	=	54,400 acres

Table M-2. Montana fuel treatment by forage category & WUI next decade

Forage category treated	Inside WUI		Outside WUI		Totals
High density	38,000	+	27,200	=	65,000 acres
Low density	34,200	+	20,800	=	55,000 acres
Lynx habitat but not good forage	106,400	+	57,600	=	164,000 acres
Not lynx habitat	201,400	+	54,400	=	255,800 acres

Table M-3. Montana fuel treatment by forage category & alternative next decade

Forage category treated	Alt A	Alt B	Alt C	Alt D	Alt E
Lynx habitat in forage condition	120,000	60,000	0	0	120,000
Lynx habitat but not good forage	160,000	160,000	160,000	160,000	160,000
Not lynx habitat	260,000	342,000	380,000	380,000	260,000
Total fuels treatment	540,000	540,000	540,000	540,000	540,000

Table M-4. Montana fuel treatment in lynx habitat by forage category, alternative & WUI next decade

	Alt A	Alt B	Alt C	Alt D	Alt E
Inside WUI					
High density young	15,000	8,000	0	0	15,000
High density multistoried	23,000	11,000	0	0	23,000
Low density young	11,000	6,000	0	0	11,000
Low density multistoried	23,000	11,000	0	0	23,000
Outside WUI					
High density young	11,000	6,000	0	0	11,000
High density multistoried	16,000	8,000	0	0	16,000
Low density young	8,000	4,000	0	0	8,000
Low density multistoried	13,000	6,000	0	0	13,000
Total fuel treatment	120,000	60,000	0	0	120,000

Assumptions

- Treated acres are proportional to their occurrence, regardless of any other factors
- Alternative B assumes 50 percent of the fuel treatment in multistoried would be done without precommercial thinning, and that half the good forage that's not treated would shift to non-lynx habitat.
- Alternatives C and D assume fuel treatment acres would shift from good forage to non-lynx habitat.

Table M-5. Montana fuel treatment acres relocated by forage category, alternative & WUI next decade

	Alt A	Alt B	Alt C	Alt D	Alt E
Inside WUI					
High density young	0	7,000	15,000	15,000	0
High density multistoried	0	12,000	23,000	23,000	0
Low density young	0	6,000	11,000	11,000	0
Low density multistoried	0	11,000	23,000	23,000	0
Outside WUI					
High density young	0	5,000	11,000	11,000	0
High density multistoried	0	8,000	16,000	16,000	0
Low density young	0	4,000	8,000	8,000	0
Low density multistoried	0	7,000	13,000	13,000	0
Total relocated	0	60,000	120,000	120,000	0

Appendix N – Management direction for the preferred alternative, Alternative E

All programs and activities – applies to lynx habitat in LAUs & linkage areas subject to valid existing rights

Goal[12]

Conserve the Canada lynx.

Objective[25] ALL O1

Maintain[22] or restore[33] lynx habitat[19] connectivity[14] in and between LAUs[17], and in linkage areas[18].

Standard[36] ALL S1

New or expanded permanent developments[28] and vegetation management projects[41] must maintain[22] habitat connectivity[14].

Standard ALL S2

A project proposal that deviates from one or more lynx standards may proceed without amending the plan, subject to ESA requirements, either:

1. If a written determination is made that the project is not likely to adversely affect lynx; or
2. If it may result in short-term adverse effects on lynx but if long-term benefits to lynx and its habitat would result.

Guideline[13] ALL G1

Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways[15] or forest highways[10] across federal land. Methods could include fencing, underpasses or overpasses.

Specific programs and activities – applies only to lynx habitat in LAUs, subject to valid existing rights

LAU boundaries

Standard[36] LAU S1

LAU[17] boundaries will not be adjusted except through agreement with the FWS, based on new information about lynx habitat[19].

Vegetative management activities and practices

Objective[25] VEG O1

Manage vegetation to be more similar to historic succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.

Objective VEG O2

Maintain or improve lynx habitat[19], emphasizing high-quality winter snowshoe hare habitat[42] near denning habitat[4].

Objective VEG O3

Conduct fire use[9] activities to restore[33] ecological processes and maintain or improve lynx habitat.

Objective VEG O4

Design regeneration harvest, reforestation and thinning to develop characteristics suitable for winter snowshoe hare habitat.

Standard VEG S1

Unless a broad scale assessment[2] has been completed that substantiates different historic levels of unsuitable habitat[20], limit disturbance in each LAU or in a combination of immediately adjacent LAUs as follows:

If more than 30 percent of the lynx habitat in an LAU or a combination of immediately adjacent LAUs is currently in unsuitable condition[20], no additional habitat may be made unsuitable by vegetation management projects[41].

This standard does not apply to fuel treatment[11] projects identified through processes such as that described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan.

Use the same analysis boundaries for all vegetation management projects subject to this standard.

Standard VEG S3

Maintain at least ten percent of the lynx habitat in an LAU as denning habitat[4] in patches generally larger than five acres.

Where less than ten percent denning habitat is present in an LAU, either:

1. Defer vegetation management projects[20] in stands that have the highest potential to develop denning habitat; or
2. Move towards ten percent denning habitat by leaving enough standing trees and coarse woody debris to be similar to what would be there naturally.

This standard does not apply to fuel treatment projects identified through processes such as that described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan.

Standard VEG S5

Precommercial thinning[30] projects that reduce winter snowshoe hare habitat during the stand initiation structural stage may occur only:

1. Within 200 feet of administrative sites, dwellings or outbuildings; or
2. For research studies[32] or genetic tree tests evaluating genetically improved reforestation stock; or
3. For fuel treatment projects identified through processes such as that described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan.

Guideline VEG G1

Vegetation management projects should be planned to recruit a high density of conifers, hardwoods and shrubs where such habitat is scarce or not available Priority should be given to stem-exclusion, closed-canopy structural stage[38].

Winter snowshoe hare habitat should be near denning habitat.

Vegetation management projects should be planned to extend the production of winter snowshoe hare habitat when forage quality and quantity is declining.

Guideline VEG G3

Vegetation management projects designed to retain or restore[33] denning habitat should be located where there is a low probability of stand-replacing fire.

Guideline VEG G4

Fire use[9] activities should not create permanent travel routes that facilitate snow compaction.

Constructing permanent firebreaks on ridges or saddles should be avoided.

Guideline VEG G5

Habitat for alternate prey species, primarily red squirrel[31], should be provided in each LAU.

Guideline VEG G7

After a disturbance that kills trees in areas five acres or smaller which could contribute to lynx denning habitat, salvage harvest[34] should not occur unless at least ten percent denning habitat in an LAU is retained and well distributed.

Guideline VEG G8

Vegetation management projects[41] should maintain[22] winter snowshoe hare habitat[42] during the understory reinitiation[40] or old-multistory structural stages[26], and may be used to maintain and improve lynx habitat where dense understories are lacking.

Livestock grazing and practices

Objective[25] GRAZ O1

Manage livestock grazing to be compatible with improving or maintaining[22] lynx habitat[19].

Guideline[13] GRAZ G1

In fire- and harvest-created openings, livestock grazing should be managed so that impacts do not prevent shrubs and trees from regenerating.

Guideline GRAZ G2

In aspen stands, livestock grazing should be managed to contribute to their long-term health and sustainability.

Guideline GRAZ G3

In riparian areas and willow carrs, livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages[24], similar to conditions that would have occurred under historic disturbance regimes.

Guideline GRAZ G4

In shrub-steppe habitats[35], livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs, to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.

Human uses management activities and practices

Objective[25] HU O1

Maintain[22] the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat[19].

Objective HU O2

Manage recreational activities to maintain lynx habitat and connectivity.

Objective HU O3

Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat.

Objective HU O4

Provide for lynx habitat needs and connectivity when developing new or expanding existing developed recreation[7] sites or ski areas.

Objective HU O5

Manage human activities – such as exploring and developing minerals and oil and gas, placing utility corridors and permitting special uses – to reduce impacts on lynx and lynx habitat.

Objective HU O6

Reduce adverse highway[15] effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity[14], and to reduce the potential of lynx mortality.

Guideline[13] HU G1

When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris, so winter snowshoe hare habitat[42] is maintained.

Guideline HU G2

When developing or expanding ski areas, nocturnal foraging should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.

Guideline HU G3

Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.

Guideline HU G4

For mineral and energy development sites and facilities, remote monitoring should be encouraged to reduce snow compaction.

Guideline HU G5

For mineral and energy development sites and facilities that are closed, a reclamation plan that restores[33] lynx habitat should be developed.

Guideline HU G6

Methods to avoid or reduce effects on lynx should be used in lynx habitat when upgrading unpaved roads to maintenance levels 4 or 5, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.

Guideline HU G7

New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity[14].

New permanent roads and trails should be situated away from forested stringers.

Guideline HU G8

Cutting brush along low-speed[21], low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.

Guideline HU G9

On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.

Guideline HU G10

When developing or expanding ski areas and trails, access roads and lift termini should be located to maintain and provide lynx diurnal security[8] habitat.

Guideline HU G11

Designated over-the-snow routes[5] or play areas should not expand outside baseline areas of consistent snow compaction[1] by LAU or in a combination of immediately adjacent LAUs, unless designation serves to consolidate use and improve lynx habitat.

This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings or where regulated by HU G12.

Use the same analysis boundaries for all actions subject to this guideline.

Guideline HU G12

Winter access for non-recreation special uses and mineral and energy exploration and development, should be limited to designated routes[6] or designated over-the-snow routes[5].

Linkage areas – applies to linkage areas, subject to valid existing rights

Objective[25] LINK O1

In areas of intermingled land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat.

Standard[36] LINK S1

When highway[15] or forest highway[10] construction or reconstruction is proposed in linkage areas[18], identify potential highway crossings.

Guideline[13] LINK G1

NFS and BLM lands should be retained in public ownership.

Guideline LINK G2

Livestock grazing in shrub-steppe habitats should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages[24], similar to conditions that would have occurred under historic disturbance regimes.

Monitoring

Map the location and amount of snow-compacting use that coincided with lynx habitat[19] in LAUs[17] during the 1998-2000 seasons for designated over-the-snow[5] and groomed routes and areas, and areas of consistent snow compaction[1]. Such activities include snowmobiling, snowshoeing, cross-country skiing, dog sledding, etc

Annually monitor the acres of vegetation management projects[41] that occurred in lynx habitat and in winter snowshoe hare habitat[42] during the previous fiscal year.

Document and evaluate the conditions under which Standard All S2 is applied.

Glossary

[1] *Areas of consistent snow compaction* – An area of consistent snow compaction is an area of land or water that during winter is generally covered with snow and gets enough human use that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after (within 48 hours) snowfall. These can be areas or linear routes, and are generally found in near snowmobile or cross-country ski routes, in adjacent openings, parks and meadows, near ski huts or plowed roads, or in winter parking areas. Areas of consistent snow compaction will be determined based on the area or miles used in 1998, 1999 or 2000.

[2] *Broad scale assessment* – A broad scale assessment is a synthesis of current scientific knowledge, including a description of uncertainties and assumptions, to provide an understanding of past and present conditions and future trends, and a characterization of the ecological, social and economic components of an area. (LCAS)

[3] *Daylight thinning* – Daylight thinning is a form of precommercial thinning that removes the trees inside a given radius around trees.

[4] *Denning habitat (lynx)* – Denning habitat is the environment lynx use when giving birth and rearing kittens until they are mobile. The most common component is large amounts of coarse woody debris to provide escape and thermal cover for kittens. Denning habitat must be within daily travel distance of winter snowshoe hare habitat –

the typical maximum daily distance for females is about three to six miles. Denning habitat includes mature and old growth[24] forests with plenty of coarse woody debris. It can also include young regenerating forests with piles of coarse woody debris, or areas where down trees are jack-strawed.

[5] *Designated over-the-snow routes* – Designated over-the-snow routes are routes managed under permit or agreement or by the agency, where use is encouraged, either by on-the-ground marking or by publication in brochures, recreation opportunity guides or maps (other than travel maps) or in electronic media produced or approved by the agency. The routes identified in outfitter and guide permits are designated by definition; groomed routes also are designated by definition. The determination of baseline snow compaction will be based on the miles of designated over-the-snow routes authorized, promoted or encouraged in 1998, 1999 or 2000.

[6] *Designated route* – A designated route is a road or trail that has been identified as open for specified travel use.

[7] *Developed recreation* – Developed recreation requires facilities that result in concentrated use. For example, skiing requires lifts, parking lots, buildings and roads; campgrounds require roads, picnic tables and toilet facilities.

[8] *Diurnal security habitat (lynx)* – Diurnal security habitat amounts to places in lynx habitat that provide secure winter daytime bedding sites for lynx in highly disturbed landscapes like ski areas. Security habitat gives lynx the ability to retreat from human disturbance during the day, so they can emerge at dusk to hunt when most human activity stops. Forest structures that make human access difficult generally discourage human activity in security habitats. Security habitats are most effective if big enough to provide visual and acoustic insulation and to let lynx easily move away from any intrusion. They must be close to winter snowshoe hare habitat. (LCAS)

[9] *Fire use* – Fire use is the combination of wildland fire use and using prescribed fire to meet resource objectives. (NIFC) Wildland fire use is managing naturally ignited wildland fires to accomplish resource management objectives in areas that have a fire management plan. This term replaces prescribed natural fire. (Wildland and Prescribed Fire Management Policy, August 1998)

[10] *Forest highway* – A forest highway is a forest road under the jurisdiction of, and maintained by, a public authority and open to public travel (USC: Title 23, Section 101(a)), designated by an agreement with the FS, state transportation agency and Federal Highway Administration.

[11] *Fuel treatment* – A fuel treatment is a management action that reduces the threat of ignition and fire intensity or rate of spread, or is used to restore fire-adapted ecosystems.

[12] *Goal* – A goal is a broad description of what an agency is trying to achieve, found in a land management plan. (LCAS)

[13] *Guideline* – A guideline is a particular management action that should be used to meet an objective found in a land management plan. The rationale for deviations may be documented, but amending the plan is not required. (LCAS modified)

[14] *Habitat connectivity (lynx)* – Habitat connectivity consists of an adequate amount of vegetative cover arranged in a way that allows lynx to move around. Narrow forested mountain ridges or shrub-steppe plateaus may serve as a link between more extensive areas of lynx habitat; wooded riparian areas may provide travel cover across open valley floors. (LCAS)

[15] *Highway* – The word highway includes all roads that are part of the National Highway System. (23 CFR 470.107(b))

[16] *Isolated mountain range* – Isolated mountain ranges are small mountains cut off from other mountains and surrounded by flatlands. On the east side of the Rockies, they are used for analysis instead of sub-basins. Examples are the Little Belts in Montana and the Bighorns in Wyoming.

[17] *LAU (Lynx Analysis Unit)* – An LAU is an area of at least the size used by an individual lynx, from about 25 to 50 mi2 (LCAS). An LAU is a unit for which the effects of a project would be analyzed; its boundaries should remain constant.

[18] *Linkage area* – A linkage area provides connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas, where basins, valleys or agricultural lands separate blocks of lynx habitat, or where lynx habitat naturally narrows between blocks. (LCAS updated definition approved by the Steering Committee 10/23/01)

[19] *Lynx habitat* – Lynx habitat occurs in mesic coniferous forest that experience cold, snowy winters and provide a prey base of snowshoe hare. In the northern Rockies, lynx habitat is generally occurs between 3,500 and 8,000 feet of elevation, and primarily consists of lodgepole pine, subalpine fir and Engelmann spruce. It may consist of cedar-hemlock in extreme northern Idaho, northeastern Washington and northwestern Montana, or of Douglas fir on moist sites at higher elevations in central Idaho. It may also consist of cool, moist Douglas fir, grand fir, western larch and aspen when interspersed in subalpine forests. Dry forests do not provide lynx habitat. (LCAS)

[20] *Lynx habitat in an unsuitable condition* – Lynx habitat in an unsuitable condition consists of lynx habitat in the stand initiation structural stage where the trees are generally less than ten to 30 years old and have not grown tall enough to protrude above the snow during winter.

Stand replacing fires or certain vegetation management projects can result in unsuitable conditions. Vegetation management projects that can result in unsuitable habitat

include clearcuts and seed tree harvest, and sometimes shelterwood cuts and commercial thinning depending on the resulting stand composition and structure. (LCAS)

[21] *Low-speed, low-traffic-volume road* – Low speed is less than 20 miles per hour; low volume is a seasonal average daily traffic load of less than 100 vehicles per day.

[22] *Maintain* – In the context of this amendment, to maintain means to provide enough lynx habitat to conserve lynx. It does not mean to keep the status quo.

[23] *Maintenance level* – Maintenance levels define the level of service provided by and maintenance required for a road. (FSH 7709.58, Sec 12.3) Maintenance level 4 is assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. Some may be single lane; some may be paved or have dust abated. Maintenance level 5 is assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-lane and paved, but some may be aggregate surfaced with the dust abated.

[24] *Mid-seral or later* – Mid-seral is the successional stage in a plant community that's the midpoint as it moves from bare ground to climax. For riparian areas, it means willows or other shrubs have become established. For shrub-steppe areas, it means shrubs associated with climax are present and increasing in density.

[25] *Objective* – An objective is a statement in a land management plan describing desired resource conditions and intended to promote achieving programmatic goals. (LCAS)

[26] *Old multistory structural stage* – Many age classes and vegetation layers mark the old forest, multistoried stage. It usually contains large old trees. Decaying fallen trees may also be present that leave a discontinuous overstory canopy. On cold or moist sites without frequent fires or other disturbance, multi-layer stands with large trees in the uppermost layer develop. (Oliver and Larson, 1996)

[27] *Old growth* – Old growth forests generally contain trees that are large for their species and site, and are sometimes decadent with broken tops. Old growth often contains a variety of tree sizes, large snags and logs, and a developed and often patchy understory.

[28] *Permanent development* – A permanent development is any development that results in a loss of lynx habitat for at least 15 years. Ski trails, parking lots, new permanent roads, structures, campgrounds and many special use developments would be considered permanent developments.

[29] *Prescribed fire* – A prescribed fire is any fire ignited as a management action to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements met, before ignition. The term replaces management ignited prescribed fire. (NWCG)

[30] *Precommercial thinning* – Precommercial thinning is mechanically removing trees to reduce stocking and concentrate growth on the remaining trees, and not resulting in immediate financial return. (Dictionary of Forestry)

[31] *Red squirrel habitat* – Red squirrel habitat consists of coniferous forests of seed and cone-producing age that usually contain snags and downed woody debris, generally associated with mature or older forests.

[32] *Research* – Research consists of studies conducted to increase scientific knowledge or technology. For the purposes of Standards VEG S5 and VEG S6, research is limited to studies financed from the forest research budget (FSM 4040) and administrative studies financed from the NF budget.

[33] *Restore, restoration* – To restore is to return or re-establish ecosystems or habitats to their original structure and species composition. (Dictionary of Forestry)

[34] *Salvage harvest* – Salvage harvest is a commercial timber sale of dead, damaged or dying trees. It recovers economic value that would otherwise be lost. Collecting firewood for personal use is not considered salvage harvest.

[35] *Shrub steppe habitat* – Shrub steppe habitat consists of dry sites with shrubs and grasslands intermingled.

[36] *Standard* – A standard is a required action in a land management plan specifying how to achieve an objective or under what circumstances to refrain from taking action. A plan must be amended to deviate from a standard.

[372] *Stand initiation structural stage* – The stand initiation stage generally develops after a stand-replacing disturbance by fire or regeneration timber harvest. A new single-story layer of shrubs, tree seedlings and saplings establish and develop, reoccupying the site. Trees that need full sun are likely to dominate these even-aged stands. (Oliver and Larson, 1996)

[38] *Stem exclusion structural stage* – In the stem exclusion stage, trees initially grow fast and quickly occupy all of the growing space, creating a closed canopy. Because the trees are tall, little light reaches the forest floor so understory plants (including smaller trees) are shaded and grow more slowly. Species that need full sunlight usually die; shrubs and herbs may become dormant. New trees are precluded by a lack of sunlight or moisture. (Oliver and Larson, 1996)

[39] *Timber management* – Timber management consists of growing, tending, commercially harvesting and regenerating crops of trees.

[40] *Understory re-initiation structural stage* – In the understory re-initiation stage, a new age class of trees gets established after overstory trees begin to die, are removed or no longer fully occupy their growing space after tall trees abrade each other in the wind. Understory seedlings then re-grow and the trees begin to stratify into vertical layers. A

low to moderately dense uneven-aged overstory develops, with some small shade-tolerant trees in the understory. (Oliver and Larson, 1996)

[41] *Vegetation management projects* – Vegetation management projects change the composition and structure of vegetation to meet specific objectives, using such means as prescribed fire and timber harvest. For the purposes of this amendment, the term does not include removing vegetation for permanent developments like mineral operations, ski runs, roads and the like, and does not apply to fire suppression or to wildland fire use.

[42] *Winter snowshoe hare habitat* – Winter snowshoe hare habitat consists of places where young trees or shrubs grow dense – thousands of woody stems per acre – and tall enough to protrude above the snow during winter, so hares can browse on the bark and small twigs (Ruediger et al. 2000). Winter snowshoe hare habitat develops primarily in the stand initiation, understory reinitiation and old forest multistoried structural stage

Note: *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan* may be found at www.fireplan.gov/reports/9-21-en.pdf.

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Figure 1-1

Northern Rockies Lynx Amendment Area

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(1 map)

Figure 1-1

Northern Rockies Lynx Amendment Area

Lynx habitat & linkage areas

as of
November 2003




National Forest lands not in this amendment
BLM Administrative Boundaries
Linkage Zones (different sizes have no significance)
Highways
Lakes
Lynx Habitat and linkage areas are subject to change as information is updated.
Clearwater
Grangeville
Bitterroot NF
Nez Perce NF
Butte
Bozeman
Wallowa-Whitman NF
Payette NF
Salmon
Dillon
Gallatin NF
Custer NF
Sheridan
Salmon-Challis NF
Challis
Yellowstone National Park
Cody
Targhee NF
Bighorn
Boise NF
Boise
Sawtooth NF
Worland
Shoshone NF
Thermopolis
Idaho Falls
Jackson
BLM Upper Snake River
Bridger-Teton NF
BLM Lower Snake River
Pocatello
Riverton
Lander
Twin Falls

Nevada

Sawtooth NF

Idaho

Utah

Wyoming

Colorado

Rock Springs

Wasatch-Cache NF

Ogden

BLM Salt Lake

Salt Lake City

Ashley NF

Uinta NF

N

W E

S

25 12.5 0 25 50 75 100 Miles



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